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OF THE

ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE FORTY-FIFTH.



1875.

EDITED BY THE ASSISTANT-SECRETARY.

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ILLUSTRATIONS.

Royal Geographical Society.

1875.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 24TH MAY.

THE Council have the satisfaction of submitting to the Fellows the following Report on the financial and general condition of the Society for the past year:—

Members.—294 Ordinary Members (of whom 35 have paid Life-compositions), and 1 Honorary Corresponding Member were elected during the year ending April 30th, 1875. In the previous year the numbers were 342 Ordinary and 9 Honorary Corresponding, and in the year 1873 the total was 221. The losses by death have been 59, and by resignation and default of subscription 33, leaving the net increase 202. In 1874 the net increase was 177; in 1873, 140; and in 1872, 78. The addition to our effective numbers is thus seen to have been greater than in any of the years immediately preceding. The Roll of Fellows (exclusive of Honorary) has now reached the large total of 2960.

Finances.—There has been a considerable increase in the ordinary income of the Society, as shown by the balance-sheet, Appendix A, over the preceding year; the amount of subscriptions having been 6425*l.* 1*s.* 6*d*, as compared with 5643*l.* 19*s.* 6*d.*; and the total net income, 7511*l.* 11*s.* 10*d.*, as compared with 6752*l.* 4*s.* 4*d.* in the previous year. In 1872 the net ordinary income was 6119*l.* 7*s.* 9*d.*; and in 1871, 5637*l.* 3*s.* 7*d.*

The ordinary expenditure of the Society, *i.e.*, exclusive of Expeditions, investments, &c., has been 5203*l.* 0*s.* 4*d.*, against 4847*l.* 5*s.* 6*d.* in the previous year. But the amount entered on the balance-sheet as contributed to the Livingstone Search and Relief Fund comes this year out of the Society's means, not being refunded, like the costs of the Congo Expedition, from other sources; this sum must, therefore, be added to the ordinary expenses, making 6992*l.* 7*s.* 2*d.* as the total net disbursements of the year.

The Finance Committee of Council, as usual, has held its monthly meetings throughout the year for supervising the accounts; and all liabilities incurred have been discharged at the monthly meetings following the delivery of the statements of account against the Society with their vouchers.

The customary annual Audit of the accounts was held this year at the end of April, the same gentlemen as before having most kindly accepted the invitation to undertake the task:—Lord Cottesloe and Sir Charles Nicholson, Bart., acting on behalf of the Council; and General Sir George Balfour, M.P., and H. Jones Williams, Esq., on that of the Fellows. The Council feel that the thanks of the Society at large, as well as their own, are due to these able and experienced gentlemen for having so cheerfully given their time and attention to this arduous labour.

Publications.—The 44th volume of the 'Journal' was published early in March last, and has been delivered to all Fellows who have applied at the office for their copies. The 18th volume of the 'Proceedings,' which is the largest the Society has yet published, has also been completed since the last Report, and four numbers of Volume 19 have been distributed to Members. It is intended this year to issue seven numbers of the 'Proceedings' instead of five, as was previously the custom.

Livingstone Aid Expeditions.—As stated in last year's Report, both the Expeditions sent to the interior of Africa in aid of Dr. Livingstone were recalled soon after the Council had received assurances of the great traveller's death. Since then one of them, viz., that sent from the West Coast by way of the

Congo, under Lieutenant Grandy, R.N., has returned, and all the expenses connected with it have been defrayed. The total cost has been 3111*l.* 19*s.* 11*d.*, the whole of which, except 70*l.* 5*s.* 10*d.*, the payment of which the Council took upon itself, was reimbursed by the munificent patron of the Expedition, Mr. James Young, of Kelly. Instruments to the value of 123*l.* 11*s.* 4*d.* were lent to the Expedition by the Society, but most of them have been returned in good order, and will be available for other travellers.

With regard to the East Coast Expedition, under Lieutenant Cameron, R.N., the letter of recall seems not to have reached the leader before his departure, in May 1874, for the remote country of Manyema. As this enterprising traveller, since the dispatch of Dr. Livingstone's remains to the coast, has done good Geographical work, and bids fair to make further important discoveries, the Council have approved of his continuing his explorations; and have started a fresh Subscription Fund to furnish him with means for so doing. The former "Livingstone Search and Relief Fund" is therefore closed, with the end of 1874; Lieutenant Cameron's expenses up to the time of his recovering Livingstone's remaining map and journals at Ujiji being charged to it. From the commencement of 1875 the fund will be called "The Cameron Expedition Fund."

A balance-sheet of the Livingstone Search and Relief Fund is appended, Appendix B.

The whole cost of the Livingstone funeral, as shown in the balance-sheet A, was reimbursed to the Society by Her Majesty's Treasury. The account for wages due to the followers of the great traveller, at the close of his last Expedition, amounting to nearly 1000*l.*, was also defrayed by the Government.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec. 1874.

In 1856 a Treasury Grant of 1000*l.* for the East African Expedition received.

In 1860 a Treasury Grant of 2500*l.* for the East African Expedition received.

In 1869 Legacy of Mr. Benjamin Oliveira, 1506*l.* 17*s.* 1*d.*

In 1870 Legacy of Mr. Alfred Davis, 1800*l.*

In 1871 Legacy of Sir Roderick Murchison, 1000*l.*

In 1872 Amount of Mr. James Young's Grant for the Livingstone Congo Expedition, 2000*l.*

In 1874 Amount of Mr. James Young's Grant for the Livingstone Congo Expedition, 1041*l.* 14*s.*

Year.	Cash Receipts within the Year.			Cash Amounts invested in Funds.			Deducting Amounts invested in Funds; actual Expenditure.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.
1848	696	10	5	..	..		755	6	1
1849	778	3	0	..	..		1098	7	6
1850	1036	10	5	..	..		877	2	10
1851	1056	11	8	..	..		906	14	7
1852	1220	3	4	..	..		995	13	1
1853	1917	2	6	..	..		1675	6	0
1854	2565	7	6	..	..		2197	19	3
1855	2584	7	0	..	..		2636	3	1
1856	3372	5	1	533	10	0	2814	8	1
1857	3142	13	4	378	0	0	3480	19	9
1858	3089	15	1	..	..		2944	13	6
1859	3471	11	8	950	0	0	3423	3	9
1860	6449	12	1	466	17	6	5406	3	7
1861	4792	12	9	1358	2	6	3074	7	4
1862	4659	7	9	1389	7	6	3095	19	4
1863	5256	9	3	1837	10	0	3655	4	0
1864	4977	8	6	1796	5	0	3647	7	10
1865	4905	8	3	1041	5	0	4307	4	5
1866	5085	8	3	1028	15	0	4052	15	0
1867	5462	7	11	1029	0	6	3943	17	4
1868	5991	4	0	1857	3	9	4156	17	10
1869	6859	16	0	2131	5	0	4646	0	8
1870	8042	6	1	3802	6	0	3845	10	6
1871	6637	3	7	1000	0	0	3726	4	4
1872	8119	7	9	1999	4	6	5871	13	2
1873	7761	18	10	2015	1	8	6697	12	6
1874	8753	5	10	499	0	0	7876	2	3

STATEMENT of ASSETS—31st December, 1874.

	£	s.	d.	£	s.	d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library) ..				20,000	0	0
Investments, viz. :—						
India 5 per Cent. Stock	£1000	0	0			
Great Western Railway 4½ per Cent. Debenture Stock (Davis Bequest)	1800	0	0			
London and North-Western Railway 4 per Cent. Debenture Stock (Murchison Bequest)	1000	0	0			
North-Eastern Railway 4 per Cent. Debenture Stock	1000	0	0			
Great Indian Peninsula Railway Guaranteed 5 per Cent. Capital Stock	2240	0	0			
March Exchequer Bills	1000	0	0			
				8,040	0	0
Balance at Bank and in hand				796	0	0
Total				£28,836	0	0

Library.—712 books and pamphlets have been added to the library during the year, exclusive of volumes and parts of periodicals, Transactions, &c., of Societies, and other continuous publications. Of these accessions, 311 (including all the pamphlets) are donations; and the remainder (401 vols.) have been purchased. The donation of 200*l.* by the late Admiral Sherard Osborn, to be applied in the purchase of books, as mentioned in the last Report, has been so expended, with the exception of a small portion retained for certain works, on order but not immediately obtainable. The sum of 221*l.* 0*s.* 7*d.*, in addition to this sum, has been expended by the Library Committee in purchasing books, and the further sum of 75*l.* 2*s.* 11*d.* in binding. Besides the numerous pamphlets and smaller works put into covers on the Society's premises, 447 volumes have been bound during the past year, and many others rebacked and re-lettered, &c.

Among the more important accessions are:—An Album of photographs of Rio de Janeiro, three Albums of photographs of Madrid, Alexandria, Cairo, and Constantinople, and Sartorius's 'Mexico and the Mexicans' (presented by C. H. Wallroth, Esq.); an Album of photographs of the Libyan Desert, presented by Dr. Gerhard Rohlfs); Mundy's 'Rotomahana' (presented by the author); Prince Maximilian's and Spix and Martius's 'Reise nach Brazilien', and Pöppig's 'Reise in Chili', with Atlases (presented by J. Bateman, Esq.); the most recent editions of all Murray's Handbooks (presented by J. Murray, Esq.); a complete set of the Encyclopædia Britannica, 8th edition; Series, so far as published, of the 'Geological Magazine', 'Russische Revue', Behm's 'Geographisch Jahrbuch', and St. Martin's 'Année Géographique'; all the wanting volumes of Malte-Brun's 'Annales des Voyages', and the 'Receuil des Voyages', completing the Library Series of those works; D'Orbigny, 'Voyage dans l'Amérique Méridionale'; Freycinet, 'Voyage de *l'Uranie et Physicienne*'; Vaillant, 'Voyage de la *Bonite*'; Duperrey, 'Voyage de la *Coquille*'; Humboldt, 'Voyage aux Régions Équinoxiales'; Rugendas, 'Voyage pittoresque dans le Brésil'; Richardson, 'Fauna Boreali-Americana' (complete); The Natural History Appendices to King and Fitzroy's Voyage of the *Beagle* and to the Voyage of the *Erebus* and *Terror*; Barker-Webb, 'Historie naturelle des Iles Canaries'; Laborde

and Linant, 'Arabie Pétrée'; Phillips, 'Mexico Illustrated'; Perry, 'Expedition to China Seas and Japan'; Cramer, 'Ancient Greece' and 'Asia Minor'; Marsigli, 'Cours du Danube'; Humbert, 'Le Japon illustré'; Prévost, 'Histoire générale des Voyages'; Morelet, 'Histoire naturelle des Açores'; 'Golden Coast' (1665); Hariot's 'Virginia' (reprint); Hennepin's Voyages (1697 and 1698); Charlevoix's S. Domingue and Paraguay; Carve's 'Itinerarium'; Pigafetta's 'Congo'; Sir Thos. Herbert's Travels; Yule's 'Marco Polo' 2nd edition (presented by Col. Yule); Vinson's 'Voyage à Madagascar'; Melliss's 'St. Helena'; and Dutch works on Greenland and Spitzbergen, by Gerret van Santé, Moubach, and Martens (presented by Commander Ianson).

Many series of publications of Scientific Societies have also been completed to date.

These additions have rendered the erection of three new presses necessary; and the consequent re-arrangement of the whole library is being actively pursued, under the superintendence of the Library Committee of Council, which has held its usual meetings.

The Library continues to be largely consulted by Fellows of the Society, private students, authors, and officers of the public departments.

Map-Room.—The accessions to the Map-Collection since the last Anniversary comprise 842 Maps on 3677 sheets; 11 Atlases containing 183 Maps, of which 5 Maps and 2 Atlases have been acquired by purchase; 6 diagrams have also been constructed.

The following are the most important of the new acquisitions:—2810 Sheets of the Ordnance Surveys of Great Britain and Ireland on various scales. Presented by the First Commissioner of Works through Sir H. James, R.E., Director.—271 Sheets of the various India Surveys. Presented by H.M. Secretary of State for India, through the India Office.—57 Sheets of British Admiralty Charts. Presented by the Lords Commissioners of the Admiralty, through their Hydrographer, Capt. F. J. Evans, C.B.—93 Sheets of French Admiralty Charts. Presented by the Dépôt des Cartes et Plans de la Marine.—34 Sheets of a General Map of Central Europe, and 13 sheets of a

Special Map of Hungary. Presented by the Imperial Geographical Institute of Vienna.—Parts 4, 5, and 6, on 38 Sheets of the Topographical Atlas of Switzerland. Presented by Col. Siegfried, Chief of the Federal Survey.—10 Sheets of the Danish Topographical Survey. Presented by the Royal Danish Ministry of War, through Count Von Bulow.—4 Sheets of the Swedish Geological Survey. Presented by Otto Torell, Chief of the Geological Survey.—Parts 17, 18, 19, and 20, of Stieler's Atlas, and parts 10 and 11 of Spruner's Atlas of the Middle Ages. Presented by Justus Perthes.—78 Maps on 184 sheets of European Countries. Presented by Lord Arthur Russell.—Part 5 of the Biblical and Classical Atlas, by Dr. W. Smith and G. Grove, Esq. Presented by Mr. Murray.—Klaproth's Map of Central Asia. Presented by A. G. Roeth, Esq., &c.

Grants to Travellers.—Instruments have been lent to the following travellers:—Capt. A. H. Markham, Arctic Sea. Standard Scale, 18-inch divided to $\frac{1}{100}$; Artificial Horizon, folding roof; Artificial Horizon, Capt. C. George's pattern, No. 73; Magnifying Glass; Parallel Ruler; Sextant, 6-inch Cary; Spare Mercury. To the value of 13*l.* 5*s.* 6*d.*—Col. C. Gordon, R.E., Khartum (by F. V. Anson). Two Watches, Brock, No. 1609, Cave, $\frac{12}{990}$; two Aneroids, registering to 15 inches; one Mercurial Barometer, Capt. C. George's pattern; Spare Tube and Mercury; Artificial Horizon, large, Capt. C. George's pattern, No. 75. To the value of 58*l.* 11*s.* 6*d.*—Col. C. Gordon, R.E., Khartum (by Lieut. C. N. Watson, R.E.), July 28, 1874. Two Pocket Chronometers; one Prismatic Compass; one Standard Scale, 18-inch, graduated to $\frac{1}{100}$ of an inch; one Parallel Ruler, 12-inch; two Bull's-eye Lanterns; besides New Instruments. To the value of 99*l.* 5*s.* 6*d.*

Receipts. APPENDIX A.—BALANCE-

1874.	£	s.	d.	£.	s.	d.	£.	s.	d.
Balance in Bankers' hands 31st Dec. 1873				4	11	6			
Ditto Accountant's Ditto				3	4	11	7	16	5
Subscriptions:—									
For the current year	3370	19	6						
Arrears	494	13	0						
Paid in Advance	415	9	0	4281	1	6			
Entrance Fees				969	0	0			
Life Compositions				1175	0	0	6425	1	6
Subscriptions paid in error				..	..		13	13	0
Parliamentary Grant				..	..		500	0	0
Royal Premium				..	..		52	10	0
Rent of Vaults				..	..		30	0	4
Sale of Publications				..	..		156	5	8
Advertisements				..	..		12	7	6
Dividends:—									
1000*l.* London and North-Western Railway 4 per Cent. Debenture Stock				39	10	10			
1000*l.* North-Eastern Railway 4 per Cent. Debenture Stock				39	10	10			
1800*l.* Great Indian Peninsula Railway 5 per Cent. Stock				89	1	3			
1000*l.* India 5 per Cent. Stock				49	9	7			
1800*l.* Great Western Railway 4½ Debenture Stock				75	12	6			
1000*l.* Exchequer Bills				28	8	10	321	13	10
Livingstone Congo Expedition, amount received of Mr. James Young				..	..		1041	14	0
Donation by Admiral Sherard Osborn for the purchase of Books				..	..		200	0	0
Dr. Livingstone's Funeral, Grant from Her Majesty's Treasury				..	..		500	19	1
Amount transferred from the Livingstone Search and Relief Fund				..	..		410	0	0
							£9672	1	4

REGINALD T. COCKS,
Treasurer.

SHEET FOR THE YEAR 1874. *Expenditure.*

1874.	£. s. d.	£. s. d.
Taxes and Fire Insurance	.. ..	58 10 0
Salaries and Wages	.. ..	1717 0 5
Library and Map-Room	.. ..	401 12 2
Overpayments returned	.. ..	59 12 6
Gold Medals, School Prizes, and other awards ..	.. ..	153 10 0
Postages, &c.	.. ..	211 1 0
Office Expenses, Coals, Gas, Stationery, Meetings, &c.	.. ..	541 19 3
Publications, Illustrations, &c.	.. ..	1674 15 6
Furniture and Repairs	.. ..	208 2 6
Expeditions:—		
Instruments for Colonel Gordon's Expedition	166 7 0	
Amount expended on account of Lieut. Grandy's Congo Expedition	883 15 1	
Amount contributed to the Livingstone Search and Relief Fund	1789 6 10	
		2839 8 11
Dr. Livingstone's Funeral, Undertaker's Bill ..	487 6 10	
Miscellaneous Expenses	13 12 3	
		500 19 1
Subscription to the Beke Testimonial Fund ..	.. ..	10 10 0
Investment:—		
Purchase of 440*l.* Great Indian Peninsula Railway 5 per Cent. Stock	.. ..	499 0 0
Balance in Bankers' hands 31st Dec. 1874 ..	789 7 9	
Do. Accountant's Do.	6 12 3	
		796 0 0
		£9672 1 4

Audited and found correct, 30th April, 1875.

COTTESLOE,
CHAS. NICHOLSON,
G. BALFOUR,
H. JONES WILLIAMS,
} Auditors.

APPENDIX B.

LIVINGSTONE SEARCH AND RELIEF FUND, FINAL ACCOUNT, 31st December, 1874.

Dr.	£	s.	d.	Cr.	£	s.	d.
1872.				1874.			
To Balance remaining in hand after defraying the expenses of Lieut. Dawson's Expedition	3277	7	11	Expenses of Lieut. Cameron's Expedition from the commencement to December 31st, 1874	5085	8	3
1874.				Gratuity to Dr. Livingstone's cook	10	10	5
Further Subscriptions received from the public	29	3	11				
Additional Subscription by the Royal Geographical Society	1000	0	0				
Balance defrayed by Ditto	789	6	10				
	£5095	18	8		£5095	18	8

HONORARY AND HONORARY CORRESPONDING MEMBERS.

JANUARY, 1876.

HONORARY.

H. I. M. Dom Pedro II., Emperor of Brazil.
H.M. Victor Emmanuel II., King of Italy.
H.M. Leopold II., King of the Belgians.
H.I.H. the Grand Duke Constantine, President of the Imperial Geographical Society of St. Petersburg.
H.R.H. the Duke of Edinburgh.
H.I.H. Ismail Pacha, The Khedive of Egypt.
H.H. Syed Barghash Ibn Syed Saïd, Sultan of Zanzibar.
H. M. Oscar II., King of Sweden and Norway.

HONORARY CORRESPONDING.

ABICH, Dr. Wm. Hermann. St. Petersburg
ALMEIDA, Dr. Candido Mendes de.
BAER, Chev. K. Von, Mem. Imp. Acad. of Science .. .. .. St. Petersburg
BALBI, M. Eugène de.
BASTIAN, Dr. Adolph .. .. .. Bremen
BERGHAUS, Prof. Heinrich .. .. Berlin
BURMEISTER, Dr. Hermann, Buenos Ayres
CHAIX, Prof. Paul .. .. .. Geneva
COELLO, Don Francisco .. .. Madrid
CORA, Signor Guido, 17 Via Providenza, Turin
CORVO, His Excellency Senhor João de Andrade .. .. Lisbon
DANA, Professor James D., New Haven, Connecticut
DUVEYRIER, M. Henri .. .. Paris
EHRENBERG, C. P. .. .. .. Berlin
ERMAN, Prof. Adolph .. .. Berlin
FAIDHERBE, Général L. .. .. France
FIGANIÉRE, Commander Jorgé César, Lisbon
FORCHHAMMER, Prof. P. W. .. .. Kiel
FREMONT, General .. .. .. New York
GUYOT, Prof., LL.D., Princeton, New Jersey
HAUSLAB, General .. .. .. Vienna
HELMERSEN, Gen. P. von, St. Petersburg
HOCHSTETTER, Dr. Ferdinand von, Pres. Imp. Geograph. Soc. of .. ... Vienna
HORNER, Le Père
IRMINGER, Rear-Admiral C. L. C., R.D.N. Copenhagen
JANSEN, Captain M. H., D.R.N., The Hague, Holland
JOCHMUS, Field Marshal Lieutenant Baron, Vienna
KENNELLY, D. J. Esq., F.R.A.S.
KHANIKOF, F. M. N. .. .. .. Paris
KIEPERT, Dr. H. .. .. Berlin
LEAL, José da Silva Mendes, Minister of the Colonies .. .. Lisbon
LINANT Pasha .. .. .. Alexandria
LÜTKE, Admiral Count F. B., Pres. of the Imp. Academy of Sciences, St. Petersburg
MADOZ, Don Pascual .. .. .. Madrid
MALTE-BRUN, M. V. A., Hon. Sec. Geogr. Soc. of.. .. .. Paris
MIRZA MALCOM KHAN, His Excellency, (Persian Minister).
NARDI, Monsignor Francesco .. Rome
NEGRI, Chevalier Cristoforo, Contrada San Francesco di Paola, No. 11, P. 2 .. Torino
NOURY, Vice-Admiral Baron de la Roncière le, Pres. French Geog. Soc. .. Paris
NUBAR PACHA, His Excellency .. Cairo
OSTEN SACKEN, Baron Fr. von der, St. Petersburg
PARDO, His Excellency Don Manuel (Pres. Republic of Peru) .. .. .. Lima
PETERMANN, Dr. Augustus .. .. Gotha
PHILIPPI, Dr. Rodulfo Armando .. Chili
PLATEN, His Excellency Count.
RAIMONDY, Don Antonio .. .. .. Lima
RANUZZI, Count Annibale .. .. Bologna
RICHTHOFEN, Baron von, (Pres. Berlin Geog. Soc. Berlin), 71 Steglitzer Strasse, Berlin
RÜPPELL, Dr. E., For. M.L.S. .. Frankfort
SALAS, Don Saturnino, Pres. Topo. Depart., Argentine Repub. .. .. Buenos Ayres
SCHEDA, Herr von, Director of the Imp. Inst. of Military Geogr. .. .. Vienna
SCHERZER, Dr. Karl von .. .. Vienna
SOLDAN, Don Mariano Felipe Paz Lima
SONKLAR, Lieut.-Col. the Chev. de, Wiener Neustadt, Vienna
STONE, Gen. C. M. P., Chief of the General Staff, Egyptian Army .. .. .. Cairo
STRUVE, Prof. Otto, Imp. Observ. of Pulkowa .. .. .. St. Petersburg
TCHIHATCHEF, M. Pierre de, 1 Piazza deyli Zuave .. ..Florence
TSCHUDI, Herr T. T. von .. .. Vienna
VÁMBÉRY, Professor Arminius .. Pesth
VASCONCELLOS É SILVA, Dr. Alfredo Casimiro de .. .. .. Rio de Janeiro
VILLAVICENCIO, Don Manuel Guayaquil
WHITNEY, J. D., Esq. (State Geologist for California), Cambridge, Massachusetts, U.S.
WILCZEK, Count .. .. .. Vienna
WRANGELL, Adm. Baron .. St. Petersburg
ZIEGLER, M. J. M. .. .. Winterthur

FELLOWS.

(JUNE, 1875.)

N.B.—*Those having * preceding their names have compounded for life.*

Year of Election.		
1868		*Abbott, Wm. S. D., Esq. 28, *Pembridge-crescent, W.*
1874		Abd-Ell-Rasak Bey. *Naval College, Alexandria.*
1863		Abdy, Rev. Albert, M.A. *Broad-st., Stamford; and United University Club, S.W.*
1859		Aberdare, Hy. A. Bruce, Lord. 1, *Queen's-gate, S.W.; and Duffryn, Aberdare, Glamorganshire.*
1851		Abinger, W. F. Scarlett, Lord. *Guards' Club, S.W.*
1865		Acheson, Frederick, Esq., C.E. *Wooden Bridge, Co. Wicklow.*
1861		Acland, J. Barton Arundel, Esq. *Mount Peel, Canterbury, New Zealand. Care of A. Mills, Esq.*, 34, *Hyde-park-gardens, W.*
1872		Acland, Dr. Henry, F.R.S., D.C.L., M.D. *Oxford.*
1873		Acland, Lieutenant W. A. Dyke, R.N. *Care of Dr. H. Acland, Oxford.*
1874	10	Acland, Sir Thos. Dyke, Bart., M.P. *Killerton, Exeter; and Athenæum Club.*
1873		Adams, Fras. O., Esq. (Secretary of Embassy). *Berlin.*
1872		Adams, W. J., Esq. *The Cedars, Mortlake-road, Richmond.*
1872		Addison, Colonel Hy. R. (Portuguese V.-Consul). 39, *Westbourne-park-villas, W.*
1862		Addison, Colonel Thomas, C.B.
1873		Adkins, Thomas, Esq. *H.M. Consul at Newchwang, China.*
1859		Ainslie, Colonel H. Francis. *Burlington-chambers*, 180, *Piccadilly, W.; and United Service Club, S.W.*
1830		*Ainsworth, W. F., Esq., F.S.A. *Ravenscourt-villa, New-road, Hammersmith, W.*
1859		Airlie, David Graham, Earl of. *Holly-lodge, Kensington, W.*
1860		Aitchison, David, Esq. 5, *Pembridge-square, Bayswater, W.*
1873	20	Aitken, Russell, Esq. 36, *Great George-street, S.W.*
1830		*Albemarle, George Thomas, Earl of. 11, *Grosvenor-square, W.; Quiddenham-hall, Larlingford, Norfolk; and Elvedon-hall, Suffolk.*
1862		Alcock, Sir Rutherford, K.C.B., D.C.L. 14, *Great Queen-street, Westminster, S.W.; and Athenæum Club, S.W.*
1838		*Aldam, William, Esq. *Frickley-hall, near Doncaster.*
1865		Aldom, Joseph R. Esq., M.A., PH. DR. *Salway-house, Leyton, Essex.*
1857		Aldrich, Captain Robert D., R.N. *Windmill-road, Croydon, Surrey, S.*
1830		Alexander, General Sir Jas. Ed., K.C.L.S., F.R.A.S., F.R.S.E., &c. 14th Regt. *United Service Club, S.W.; and Westerton-house, Bridge of Allan, N.B.*
1873		Alexander, W., Esq. *Care of Messrs. Grindlay and Co.*, 55, *Parliament-street.*
1870		Alford, Lewis, Esq. 2, *Little Love-lane, E.C.*
1873		Alforth, C. E., Esq. 4, *Elgin-road, Notting-hill, W.*

Year of Election.	
1864	30 Allan, C. H., Esq. 104, *Albion-road, Stoke Newington, N.*
1857	Allan, G. W., Esq. *Moss Park, Toronto, Canada. Care of Major Aylmer, 50, Jermyn-street, W.*
1871	*Allcroft, John D., Esq. 108, *Lancaster-gate, W.; Harlington, Middlesex; and Stokesay, Shropshire.*
1874	Allen, C. F. R., Esq. *Chefoo, China. Care of Messrs. King and Co., 65, Cornhill, E.C.*
1865	Allen, James Pearce, Esq. 13, *Waterloo-place, S.W.*
1874	Allen, James, Esq. *Warrington-house, Duppas-hill, Croydon.*
1873	Allen, John Seymour, Esq. *Woodfield, Pembroke; and Balliol-college, Oxford.*
1873	Allen, Thos. B., Esq. 40, *Regent's-park-road, N.W.*
1862	*Almeda, Emnauel de, Esq. 11, *Hyde-park-gardens, S.W.*
1874	*Alt, W. J., Esq. *Woburn-park, Weybridge; and Thatched-house Club, St. James's-street, S.W.*
1874	40 Altschul, Dr., M.A., M.S.A., M. Philol. Soc., &c. 9, *Old Bond-street, W.*
1872	Amstel, Jonkheer J. W. Ploos Van, Esq. (Knight of the Order of the Netherland Lion, and His Netherland Majesty's Con.-Gen. for the Australian Colonies and New Zealand). *Keizersgracht, No. 163, Amsterdam. Care of Messrs. Hickie, Borman & Co., 127, Leadenhall-street, E.C.*
1854	Ancona, J. S., Esq. 8, *John-street, Adelphi, W.C.*
1874	Anderson, Alex. Dunlop, Esq. *Ardsheal, Ballachulish, Argyleshire.*
1874	Anderson, Geo., Esq., Deputy Inspector-General of Army Hospitals. *Care of Sir Charles M'Gregor and Co., Charles-street, S.W.*
1867	Anderson, Sir Henry L., K.C.S.I. *India-office, S.W.*
1871	Anderson, Sir James. 16, *Warrington-crescent, W.*
1862	Anderson, James, Esq. 1, *Billiter-court, City, E.C.*
1861	Anderson, John, Esq. *Reform Club, Pall-mall, S.W.*
1871	Anderson, Sir Wm. Geo., K.C.B. 1, *Buckingham-gate, S.W.*
1873	50 Anderson, Colonel W. W.
1870	Anderson, Wm. Jas., Esq. *Sans Souci, Newlands, near Cape Town, Cape of Good Hope. Care of Messrs. Sinclair, Hamilton & Co., 17, St. Helen's-place, E.C.*
1856	*Andrew, William P., Esq. 29, *Bryanston-square, W.*
1867	Andrews, G. H., Esq. *The Cedars, New Brentford.*
1866	Andrews, John R., Esq. 14, *Bryanston-square, W.*
1875	Andrews, Thomas R., Esq., J.P. *Cleveland-house, Wimbledon-park, S.W.*
1868	Angas, George F., Esq. 48, *Norland-square, Holland-park, W.*
1873	Angelo, Hy. Cavendish A., Esq. *Asuncion, Paraguay.*
1861	Ansell, Maurice, Esq. 15, *George-street, Hanover-square, W.*
1853	Ansted, Prof. D. T., M.A., F.R.S., &c. 33, *Brunswick-square, W.C.; Athenæum Club, S.W.; and Château Vieux, St. Léonard, Boulogne-sur-Mer.*
1873	60 Anstey, George A., Esq. *Windham Club, S.W.*
1857	Anstruther, Major-General Philip, C.B., Madras Artillery. *Airth-castle, by Falkirk, N.B.*
1864	Anstruther, Capt. R. L., Rifle Brigade. *Blue Gate, Ipswich.*

Year of Election.	
1868	Arbuthnot, George, Esq. 23, *Hyde-park-gardens, W.*
1862	Arbuthnot, Major George, R.H.A. *Cowarth, Sunningdale.*
1872	Archibald, Wm. Fredk. A., Esq. 3, *Amersham-road, Putney, S.W.*
1866	*Arconati, The Marquis Giammartino. *Casa Prini, Pisa. Care of Messrs. Bocca, Bros., Turin. Per Messrs. Barthes and Lowell, Great Marlborough-street, W.*
1870	Ardagh, Capt. John C., R.E. *Union Club, Brighton.*
1855	*Arden, Richard Edward, Esq. *East Burnham-house, Buckinghamshire.*
1858	*Armistead, Rev. Charles John, M.A., F.S.A. *United University Club, S.W.*
1863	70 Armitage, Edward, Esq. 3, *Hall-road, St. John's-wood, N.W.*
1867	*Armitstead, George, Esq., M.P. *Errol-park, Errol, N.B.*
1857	Armstrong, Sir Alexander, K.C.B., LL.D., F.R.S., Director-General of the Navy Medical Department. *Admiralty, Somerset-house, W.C.; and Junior United Service Club, S.W.*
1875	Arnold, Edwin, Esq. '*Daily Telegraph,*' *Fleet-street, E.C.*
1871	Arrow, Sir Fred. *Trinity-house, Tower-hill, E.C.; and Pilgrim's-hall, Brentwood, Essex.*
1863	Arthur, Colonel Sir Frederick, Bart. 24, *Queen's-gate, South Kensington, W.*
1863	Arthur, Captain William, R.N.
1872	Artingstall, M. Geo., Esq., J.P. *Latchford-house, Warrington.*
1869	Ashbee, Edmund Wm., Esq., F.G.S. 17, *Mornington-crescent, Regent's-park, N.W.*
1873	*Ashton, Captain Samuel Tudor. 7, *Palmeira-square, Brighton.*
1870	80 *Ashton, Charles, Esq. *Maplewell, Loughborough.*
1864	*Ashton, R. J., Esq. *Hatton-court, Threadneedle-street, E.C.*
1853	*Ashwell, James, Esq., M.A., F.G.S.
1830	*Atkins, John Pelly, Esq., F.S.A. *Halsted-place, near Sevenoaks.*
1870	Atkinson, William, Esq., F.L.S., &c. 47, *Gordon-square, W.C.*
1869	Atlee, Charles, Esq. *The Park, Ealing, W.*
1860	Attwell, Professor Henry. *Barnes, S.W.*
1859	Austen, Major Henry H. Godwin, 24th Foot, Bengal Staff Corps. *Junior United Service Club, S.W.; and Shalford-house, near Guildford, Surrey.*
1863	Austin, John G., Esq. *Care of the Colonial Company,* 16, *Leadenhall-street, E.C.*
1854	Ayrton, Right Hon. Acton S. 11, *Bolton-street, Piccadilly.*
1874	90 Baber, Colborne, Esq. 7, *Bloomsbury-place, Bloomsbury-square, W.C.; and Foreign-office, S.W.*
1866	*Babington, William, Esq., *St. Kilda, Buckhurst-hill, Essex.*
1836	*Back, Admiral Sir Geo., D.C.L., F.R.S. 109, *Gloucester-place, Portman-sq., W.*
1875	*Backler, Hy. McL., Esq. *Vernon-house, Lordship-lane, Dulwich, S.E.*
1866	Bacon, Geo. Washington, Esq. 127, *Strand, W.C.*
1873	Baden-Powell, Henry W. S., Esq. 1, *Hyde-park-gate South, S.W.*
1864	Badger, Rev. Geo. P. 21, *Leamington-road-villas, Westbourne-park, W.*
1873	Bagge, Sir William, Bt., M.P. *Stradsett-hall, Market Downham, Norfolk.*
1863	Bagot, Christopher N., Esq. *Oriental Club, W.*

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Year of Election.

1862 Bagot, Capt. L. H. *Care of C. S. Bagot, Esq., 40, Chancery-lane, W.C.*

1859 100 Bailey, L. C., Esq., Staff Commander, R.N. *Topographical Department, Adair-house, St. James's-square, S.W.*

1872 Baillie, Capt. Wm. Hunter. 43, *Norfolk-square, W.*

1857 Baillie, Lieut.-Col. John (Bengal Staff Corps.) 17, *Palace-gardens-terrace, Kensington, W.*

1875 *Bain, Hon. James. *Glasgow.*

1874 Bainbridge, Jno. Hugh, Esq. 115, *Eaton-square, S.W.*

1857 Baines, Thomas, Esq. *Care of E. L. King, Esq., 35, Austin-street, King' Lynn, Norfolk.*

1873 Baines, W. Mortimer, Esq. *Bell-hall, York.*

1861 *Baker, John, Esq.

1862 Baker, Captain Robert B. *Oriental Club, Hanover-square, W.*

1865 Baker, Sir Samuel White, Pasha, F.R.S. *Sandford Orleigh, near Newton Abbot.*

1871 110 Baker, T. B., Esq., C.B. *Wickham-park-terrace, Lewisham.*

1873 Baker-Cresswell, Lieutenant G. George. *Cresswell, Morpeth.*

1861 Balfour, Colonel David. *Balfour-castle, Kirkwall, N.B.*

1847 Balfour, Lieut.-Gen. Sir George, K.C.B., R.A., M.P. 6, *Cleveland-gardens, Hyde-park, W.; and Oriental Club, Hanover-square, W.*

1870 Balfour, Captain George M., R.N. 3, *Surrey-villas, Upper Norwood.*

1853 Balfour, John, Esq. 13, *Queen's-gate-place, S.W.*

1860 Ball, John, Esq., F.R.S. 10, *Southwell-gardens, South Kensington.*

1872 Balls, W. H., Esq. 3, *The Terrace, Kennington-park, S.E.*

1852 Bancroft, Col. W. C., 16th Regt. *M'Gregor and Co., Charles-street, S.W.*

1873 Bandini, His Highness Prince Giustiniani. *Rome. Care of Messrs. Baring Brothers & Co., 8, Bishopsgate-street-within, E.C.*

1875 120 Bannatyne, Neil, Esq. *Kames-house, Clapham-park.*

1858 Bannerman, Sir Alexander, Bart. 46, *Grosvenor-place, S.W.*

1872 Barber, Wm. Cambridge, Esq. *Crossley Orphan Home and School, Savile-park, Halifax.*

1874 Barbour, W. Boyle, Esq. *Springvale, Hilton-lane, Prestwich, near Manchester.*

1869 Barchard, Francis, Esq. *Horsted-place, Uckfield.*

1874 Barclay, Charles George, Esq. 30, *Phillimore-gardens, Kensington, W.*

1873 Barclay, Hugh G., Esq. *Monkhams, Woodford, Essex.*

1870 Barclay, Wm. L., Esq., B.A. *Leyton, Essex.*

1863 Barford, A. H., Esq., M.A. 1, *Cornwall-terrace, Regent's-park, N.W.*

1870 Baring, Capt. Evelyn, R.A. 11, *Berkeley-square, W.*

1835 130 *Baring, John, Esq. *Oakwood, Chichester.*

1844 *Baring, Thomas, Esq., M.P., F.R.S. 41, *Upper Grosvenor-street, W.*

1870 Barkly, Sir Henry, K.C.B., Governor of the Cape.

1862 Barlee, Frederick Palgrave, Esq. *Perth, Western Australia. Care of G. Laurence, Esq., 12, Marlboro'-road, Lee, S.E.*

1868 Barlow, Frederick Thomas Pratt, Esq. 26, *Rutland-gate, S.W.*

Year of Election.

1871 Barnes, Robert, Esq., M.D. 31, *Grosvenor-street, W.*

1872 Barnett, Edwd. Wm., Esq.

1864 Barnett, H. C., Esq., J.P. *York, West Australia.*

1867 *Barns, John W., Esq. *Bhawulpore, Punjaub, India; care of Messrs. Grindlay, 55, Parliament-street, S.W.*

1870 Barr, Edward G., Esq. 76, *Holland-park, W.; and* 36, *Mark-lane, E.C.*

1873 140 Barrett, Benjamin, Esq. *Licensed Victuallers' School, Kennington-lane, S.W.*

1875 Barrett, Howard, Esq., M.R.C.S. 3, *Tavistock-square, W.C.*

1859 Barrington, George, Viscount, M.P. 20, *Cavendish-square, W.*

1867 Barrington Ward, Mark J., Esq., B.A., F.L.S. (Her Majesty's Inspector of Schools). *Oakendale, Kenwood, Sheffield; and United University Club, S.W.*

1833 Barrow, John, Esq., F.R.S., F.S.A. 17, *Hanover-terrace, Regent's-park, N.W.*

1863 Barry, Alfred, Esq. *Shortlands, Bromley.*

1857 Bartholomew, John, Esq. 17, *Brown-square, Edinburgh.*

1862 Barton, Alfred, Esq., M.D. *Oriental Club, W.*

1874 Barton, Dr. Geo. Kingston. *Buckhurst-hill, Essex.*

1837 *Bateman, James, Esq., F.R.S., F.L.S. 9, *Hyde-park-gate South, W.*

1859 150 Bateman, John F., Esq., C.E., F.R.S. 16, *Great George-street, Westminster, S.W.*

1873 Bates, General Henry, C.B. 2, *Sussex-place, Hyde-park, W.*

1866 Bateson, George, Esq. *Heslington-hall, York.*

1873 Batten, Henry Howard, Esq. 21, *St. George's-square, S.W.; and Junior Carlton Club, Pall-mall, S.W.*

1866 Batten, John H., Esq. 5, *Mansten-terrace, Heavitree, Exeter.*

1872 Battiscombe, Major Wm. Benj. *United Service Club, Pall-mall, S.W.*

1858 Baxendale, Joseph H., Esq. *Worplesdon, Guildford.*

1867 Baxter, Richard, Esq., Barrister-at-Law. 32, *Leinster-gardens, Bayswater, W.*

1863 Bayley, H., Esq. *Blackheath-park, Kent.*

1873 *Baylis, Capt. E. W. D. *The Cedars, Horsemoor-green, Slough, Bucks.*

1862 160 Bayly, Lieut.-Col. John, R.E. *Ordnance Survey Office, Southampton.*

1872 *Baynes, A. Henry, Esq. 19, *Castle-street, Holborn, E.C.*

1862 Baynes, Lieut.-Col. R. Stuart. *Army and Navy Club, S.W.; and* 38, *Jermyn-street, S.W.*

1872 *Baynes, Wm. Wilberforce, Esq., D.L. *Campbelton House, Croydon.*

1868 Baynton, Captain Edward. *Trafalgar-lodge, Shirley, Southampton.*

1874 Beach, W. J., Esq. 88, *Great Tower-street, E.C.*

1871 Beadon, Sir Cecil, K.C.S.I. *Cheltenham; and* 15, *Elvaston-place, South Kensington, W.*

1874 Beall, Geo., Esq., Secretary Local Marine Board. *Liverpool.*

1874 Beardmore, Nathaniel St. B., Esq. 30, *Great George-street, S.W.*

1872 Beaton, Capt. John. 13, *Palace-gardens-terrace, W.*

1854 170 *Beaufort, William Morris, Esq., Bengal Civil Service. *Athenæum Club, S.W.*

1856 Beaumont, John Aug., Esq. 81, *Lancaster-gate, W.; and Wimbledon-park-house, Wimbledon, S.W.*

1870 *Beaumont, Somerset, Esq. 23, *Park-street, Park-lane, W.*

Year of Election.		
1851		*Beaumont, Wentworth B., Esq., M.P. 144, *Piccadilly, W.; and Bretton-park, Wakefield.*
1872		Beavan, Lieut. Reginald. *Messrs. Grindlay and Co.*, 55, *Parliament-street, S.W.*
1867		Beazeley, Michael, Esq., M.I.C.E. 4, *Morden-terrace, Rochester.*
1871		Beazley, Captain Geo. G., 83rd Regiment. *Army and Navy Club, S.W.*
1865		Bebb, Horatio, Esq. 13, *Gloucester-place, W.; and Leamington.*
1870		*Bective, Thomas, Earl of. 35, *Dover-street, W.; and Underley-hall, Kirkby Lonsdale, Westmoreland.*
1875		Bedbrook, W. H., Esq. *Blenheim-house, Wimbledon, S.W.*
1859	180	Bedford, Rear-Admiral G. Augustus. *South-view, Widmore-road, Bromley, Kent.*
1872		Bedwell, F. Le Breton, Esq. *Rozelle, Wallington, Surrey.*
1874		Beech, Geo. Müller, Esq. 83, *Park-street, Grosvenor-square, W.*
1870		*Beer, Julius, Esq. 23, *Park-crescent, Portland-place, W.*
1875		Beesly, Edwd. Fras., Esq. 20, *Craig-street, Queen's-road, Manchester.*
1868		Bedingfeld, Felix, Esq., C.M.G. 36, *Green-st., Park-lane; and Reform Club, S.W.*
1861		*Begbie, James, Esq. 2, *East-India-avenue, Leadenhall-street, E.C.*
1860		Begbie, Thomas Stirling, Esq. 4, *Mansion-house-place, E.C.*
1853		Belcher, Rev. Brymer. *St. Gabriel's, Pimlico, S.W.*
1830		*Belcher, Admiral Sir Edward, K.C.B., F.R.A.S. 13, *Dorset-st., Montagu-sq., S.W.*
1858	190	Beldam, Edw., Esq. *Royston, Herts.*
1858		*Bell, C. Davidson, Esq., late Surveyor-General, Cape of Good Hope. 4, *Danube-street, Edinburgh.*
1874		Bell, H. Douglas, Esq. *Dial-house, Cleethorpes, Lincolnshire.*
1875		Bell, Joshua P., Esq. 12, *Albemarle-street, W.*
1868		Bell, Wm. A., Esq., B.A., M.D. 18, *Hertford-street, Mayfair, W.*
1871		Bell, Major W. M. *Belgrave-mansions, S.W.*
1874		Bell, William Moore, Esq. *Wigton, Cumberland.*
1864		Bellamy, Edward, Esq.
1872		Bellville, Alfred, Esq. 20, *Penn-road-villas, Holloway, N.*
1863		Belmore, The Earl of. *Governor of New South Wales.*
1873	200	Benjamin, Horace B., Esq. 22, *Glasshouse-street, Regent-street, S.W.*
1870		Benjamin, Joseph, Esq. 22, *Glasshouse-street, Regent-street, W.*
1830		*Bennett, John Joseph, Esq., F.R.S. *Sandrock, Maresfield, Sussex.*
1857		*Bennett, J. Risdon, Esq., M.D. 15, *Finsbury-square, E.C.*
1872		Bennie, A., Esq. 7, *Broad Sanctuary, Westminster, S.W.; and Oriental Club, W.*
1856		*Benson, William, Esq., Barrister-at-Law. *Langtons, Alresford, Hants.*
1830		Bentham, George, Esq., Pres. L.S. 25, *Wilton-place, S.W.*
1874		Bentinck, Major-General A. Cavendish. *East-court, Wokingham, Berks; and 5, Grosvenor-crescent, S.W.*
1868		Bentley, George, Esq. *Upton-park, Slough.*
1870		Benyon, Wm. H., Esq. *Spellow-hill, Boro'bridge, Yorkshire.*
1859	210	Berens, H. Hulse, Esq. *Sidcross, Foot's Cray, Kent.*
1865		Bernard, P. N., Esq. 16, *Leadenhall-street, E.C.*
1856		Berry, Josiah, Esq. 16, *Regent-square, W.C.*

Year of Election.		
1872		Berthon, Peter Hy., Esq. 20, *Margaret-street, Cavendish-square, W.*
1871		Best, Commr. Jno. Chas. 91, *Westbourne-terrace, Hyde-park, W.*
1863		Best, William, Esq. *Kelstone, Millbrook, S. Hants.*
1867		Best, William John, Esq. *Franklin-street, Belfast.*
1867		Bethune, Alexander M., Esq. *Otterburn, Hamlet-road, Upper Norwood; and* 122, *Leadenhall-street, E.C.*
1842		*Bethune, Admiral C. R. Drinkwater, C.B. 4, *Cromwell-road, South Kensington, W.*
1836		Betts, John, Esq. 115, *Strand, W.C.*
1866	220	Bevan, William, Esq. 12, *Bolton-gardens, South Kensington, W.*
1873		*Bibby, Edward, Esq. *Care of John Bibby, Esq., Hart-hill, Liverpool.*
1862		Bicker-Caarten, Peter, Esq. 30, *Northumberland-place, Bayswater, W.*
1871		Bickersteth, Ven.-Archd., D.D. *The Prebendal, Aylesbury, Buckinghamshire.*
1868		*Bickmore, A. S., Esq., M.A., PH.D., Superintendent of the American Museum of Natural History. *Central-park, New York.*
1866		Bicknell, Algernon S., Esq. 37, *Onslow-square, S.W.*
1860		Bidder, G. Parker, Esq., C.E. 24, *Gt. George-st., S.W.; and Mitcham, Surrey, S.W.*
1871		Biddulph, Geo. Tournay, Esq. 43, *Charing-cross, S.W.*
1874		Biddulph, John, Esq. *Swansea.*
1869		Bidie, Geo., Esq., M.D., &c. *Bridge of Allan, N.B.*
1865	230	Bidwell, Charles Toll, Esq. *H.M. Consul, Balearic Islands. Care of H. J. Bidwell, Esq., Audit-office, Somerset-house, W.C.*
1859		Bigge, Frederick W., Esq. *Wavendon-house, Woburn.*
1868		Biggs, C. H. Walker, Esq. 2, *Alexandra-terrace, Reading.*
1850		Bigsby, John J., Esq., M.D., F.R.S. 89, *Gloucester-place, Portman-square, W.*
1871		Birch, Hon. J. F. Woodford, Colonial Secretary. *Singapore.*
1860		Birch, H. W., Esq. 46, *Welbeck-street, Cavendish-square, W.*
1858		Birch, John William, Esq. 9c, *New Broad-st., E.C.; and* 27, *Cavendish-sq., W.*
1862		*Birchill, Captain B. H. H. *Junior Carlton Club, S.W.*
1872		*Bird, Richard, Esq. *Wynyan-house, Fulham, S.W.*
1874		Birdwood, Geo., Esq., M.D. *India Museum, India-office, S.W.; and Acton, W.*
1867	240	*Bischoffsheim, Henri Louis, Esq. 75, *South Audley-street, W.*
1858		Bishop, George, Esq., F.R.A.S. *Union Club, S.W.; and The Meadows, Twickenham, S.W.*
1861		Bishop, James, Esq. 11, *Portland-place, W.*
1870		Bishop, Wm. Henry, Esq. 8, *Prince of Wales-terrace, Kensington-palace, W.*
1867		Bisson, Capt. Frederick S. de Carteret, R.I.M. 70, *Berners-street, W.*
1870		Black, Andrew H., Esq. 23, *Royal-crescent, Glasgow.*
1860		*Black, Francis, Esq. 6, *North-bridge, Edinburgh.*
1867		Black, Thomas, Esq., Superintendent P. and O. Steam Navigation Company's Dockyard. *Oriental-place, Southampton.*
1869		Blacker, Louis, Esq. *Flowermead, Wimbledon-park, S.W.*
1870		Blackie, Thos. M., Esq., F.S.A. *Chipping-hill School, Witham, Essex.*
1849	250	Blackie, W. Graham, Esq., PH. DR. 17, *Stanhope-street, Glasgow.*

Year of Election.		
1871		Blackmore, W., Esq. _Founder's-court, Lothbury, E.C._
1862		*Blackstone, Frederick Elliot, Esq., B.C.L. _British Museum, W.C._
1873		Blagden, Robert, Esq. _Junior Carlton Club, Pall-mall, S.W._
1869		Blaine, Henry, Esq. 2, _Cleveland-road, Castle-hill, Ealing, W._
1874		Blair, Major H. F., R.E. 1, _Clarendon-place, Hyde-park-gardens, W._
1865		Blake, Brig.-Gen. H. W.
1857		*Blake, Wollaston, Esq., F.R.S. 8, _Devonshire-place, W._
1872		Blakemore, Ramsey, Esq. _Wimbledon, S.W._
1861		*Blakeney, William, Esq., R.N. _Secretary to Hydrographic-office, S.W._
1868	260	Blakiston, Matthew, Esq. 18, _Wilton-crescent, S.W._
1857		Blakiston, Captain Thomas, R.A. 18, _Wilton-crescent, S.W._
1868		Blanc, Henry, Esq., M.D., &c. _Care of Messrs. H. S. King and Co._, 45, _Pall-mall, S.W._
1874		Blanch, Jno., Esq. _Care of W. H. Blanch, Esq._, 11, _Denman-road, Peckham, S.E._
1873		*Blanford, W. T., Esq., F.G.S. 12, _Keppel-street, Russell-square, W.C._
1857		Blanshard, Richard, Esq. _Fairfield, Lymington, Hants._
1874		Blaquière, Capt. Lord de, R.N. _Scientific Club_, 7, _Savile-row, W._
1854		Blencowe, W. Robert, Esq. _The Hook, Lewes._
1839		*Blewitt, Octavian, Esq. 4, _Adelphi-terrace, Strand, W.C._
1864		Blore, Edward, Esq., D.C.L., F.R.S., F.S.A., &c. 4, _Manchester-square, W._
1866	270	Blow, William Wootton, Esq. _Care of Robert Evans, Esq., Belvedere-park, North Kent._
1868		Blumberg, George F., Esq. _Mansfield-house, Clifton-gardens, Maida-vale, W._
1872		*Blundell, Charles Weld, Esq. _Ince, Blundell-hall, Great Crosby; and Brookes's Club._
1837		*Blunt, Jos., Esq.
1863		*Blunt, Wilfred S., Esq. _Worth, Crawley, Sussex._
1871		Blyth, Henry, Esq. 53, _Wimpole-street, S.W._
1868		Blyth, Philip P., Esq. (J.P. for Middlesex). 53, _Wimpole-street, W._
1858		Bohn, Henry G., Esq. 18, _Henrietta-street, Covent-garden, W.C.; and North-end-house, Twickenham, S.W._
1874		Boileau, Colonel G. W. _Stanfield-hall, Wymondham._
1850		Bollaert, William, Esq. 36, _Weymouth-street, Portland-place, W._
1862	280	Bolton, Major Francis John, 12th Regiment. 2, _Westminster-chambers, S.W._
1861		Bompas, George Cox, Esq. 15, _Stanley-gardens, Kensington-park, W._
1861		Bonney, Charles, Esq. _Adelaide, Australia._
1858		Bonnor, George, Esq. 49, _Pall-mall, S.W.; and_ 2, _Bayswater-terr., Kensington-square, W._
1865		Bonwick, James, Esq. _St. Kilda, Melbourne. Care of W. Beddow, Esq._, 22, _South Audley-street, W._
1872		Booker, Samuel, Esq. 47, _Albany, Old Hall-street, Liverpool; and Demerara._
1866		Booker, Wm. Lane, Esq. _Care of Messrs. F. O'Brien and Co._, 43, _Parliament-street, S.W._
1845		*Borrer, Dawson, Esq. _Altmont Ballon, Co. Carlow, Ireland._

Year of Election.	
1874	Booth, John, Esq. *Training College, Exeter.*
1856	*Botcherby, Blackett, Esq., M.A. 174, *Brompton-road, S.W.*
1871	290 Bourne, John, Esq., C.E. 21, *Richmond-road, Bayswater, W.*
1874	Bourne, Robert, Esq., J.P. *Grafton-manor, Bromsgrove.*
1872	Bousfield, William, Esq., B.A. 31, *Stanhope-gardens, Queen's-gate, W.*
1860	Boustead, John, Esq. 34, *Craven-street, Strand, W.C.*
1866	*Boutcher, Emanuel, Esq. 12, *Oxford-square, Hyde-park, W.*
1865	Bouverie, P. P., Esq. 32, *Hill-street, Berkeley-square, W.*
1867	Bowell, Wm., Esq., F.E.I.S. *Chandos-house, Hereford; and Gate-house Grammar-school, Hereford.*
1861	*Bowen, Charles Christopher, Esq. *Christchurch, Canterbury, New Zealand. Care of A. O. Ottywell, Esq.*, 7, *Westminster-chambers, S.W.*
1854	*Bowen, Sir George Ferguson, G.C.M.G., M.A., Governor of Victoria. *Care of Messrs. Cocks, Biddulph and Co.*, 43, *Charing-cross, S.W.; and Athenæum Club, Pall Mall, S.W.*
1871	*Bowers, Captain Alexander. *Care of Messrs. Fraser and Co., Penang.*
1871	300 Bowes, John, Esq. *Warrington, Lancashire.*
1862	Bowie, John, Esq. *Conservative Club, S.W.*
1869	Bowker, James Henry, Esq. *Basutoland, South Africa. Care of Messrs. King and Co., Cornhill, E.C.*
1868	Bowly, William, Esq. *Cirencester.*
1856	Bowman, John, Esq. 9, *King William-street, E.C.*
1865	Bowring, John Charles, Esq.
1866	Bowring, Samuel, Esq. 1, *Westbourne-park, W.*
1868	Bowser, Alfred T., Esq. *Cromwell-house, Hackney, E.*
1862	Boyce, Rev. W. B., Secretary to Wesleyan Missionary Society. *Wesleyan Mission-house, Bishopsgate-street, E.C.*
1845	*Boyd, Edward Lennox, Esq., F.S.A. 35, *Cleveland-square, Hyde-park, W.*
1874	310 Boyd, William, Esq., M.A., F.R.S.E., F.S.A., &c. *Peterhead, Aberdeenshire.*
1869	Boyle, Richard Vicars, Esq., C.S.I., Engineer in Chief to the Government Railways and Telegraph. *Japan. Care of Messrs. Grindlay and Co.*, 55, *Parliament-street, S.W.*
1874	Boyson, Ambrose P., Esq. *East-hill, Wandsworth, S.W.*
1870	*Bragge, William, Esq., C.E. *Shirle's-hill, Sheffield.*
1862	Braithwaite, Isaac, Esq. 27, *Austin-friars, E.C.*
1863	*Bramley-Moore, John, Esq. *Langley-lodge, Gerrard's-cross, Bucks.*
1859	*Brand, James, Esq. 109, *Fenchurch-street, E.C.*
1868	Brand, James Ainsworth, Esq. 12, *Hereford-gardens, Park-lane, W.*
1874	Brand, Jno. Hy., Esq. President Orange Free State Republic, S. Africa. *Care of Henry Blyth, Esq.*, 53, *Wimpole-street, W.*
1872	Brander, Captain William M., 24th Foot.
1867	320 Brandis, Dr. D., F.L.S. *Director of Forests, Calcutta. Care of W. H. Allen, Esq.*, 13, *Waterloo-place, S.W.*
1874	*Brandreth, Hy. P., Esq. *Standish-rectory, Wigan, Lancashire.*

Year of Election.		
1875		Branson, W. Powell, Esq. 23, *Rectory-grove, Clapham, S.W.; and* 155, *Fenchurch-street, E.C.*
1871		*Brassey, Thomas, Esq., M.P. 24, *Park-lane, W.; and Normanhurst-court, Battle.*
1874		Bray, Joseph, Esq., C.E. 26, *Queen's-gate-gardens, S.W.*
1859		Braybrooke, Philip Watson. *Assistant Colonial Secretary, Ceylon. Messrs. Price and Co., Craven-street, W.C.*
1874		Brent, Algernon, Esq. *Audit-office, Somerset-house, W.C.*
1834		*Breton, Commr. Wm. Henry, R.N., M.R.I. 15, *Camden-crescent, Bath; and The Rectory, Charmouth, Dorset.*
1862		Brett, Charles, Esq.
1867		Bridge, John, Esq. *Heatley-house, near Lymm, Cheshire.*
1874	330	Bridgeman, Granville, Esq. 29, *Thistle-grove, S.W.; and Junior Conservative Club, King-street, St. James's.*
1873		Bridger, Captain W. Milton, R.N. *Army and Navy Club, S.W.*
1858		Bridges, Nathaniel, Esq.
1852		*Brierly, Oswald W., Esq. 38, *Ampthill-square, N.W.*
1865		Briggs, Colonel J. P. *Lantern Tower, Jedburgh.*
1861		*Bright, Sir Charles T., F.R.A.S. 26, *Duke-street, Westminster, S.W.*
1868		Bright, Henry Arthur, Esq. *Ashfield, Knotty Ash, Liverpool.*
1860		Bright, James, Esq., M.D. 12, *Wellington-square, Cheltenham.*
1854		Brine, Colonel Frederic, R.E., K.T.S., Assoc. Inst. C.E., F.Z.S., Executive Engineer, Punjaub. *Army and Navy, Athenæum, R.A. and R.E., and United Service Clubs, S.W.; and Garrick Club, W.C.*
1856		Brine, Captain Lindesay, R.N. *Boldre-house, Lymington, Hants; United Service Club, S. W.; and H.M.S. 'Briton,' East Indies.*
1861	340	Bristowe, Henry Fox, Esq. 6, *Chesham-place, S.W., and* 22, *Old-square, Lincoln's-inn, W.C.*
1875		*Broadmead, Jas., Esq., B.A. 20, *Davies-street, Berkeley-square; and Enmore-park, Bridgewater.*
1861		Broadwater, Robert, Esq. 3, *Billiter-square, Fenchurch-street, E.C.*
1861		Brodie, Walter, Esq. *Orsett-house, Orsett-terrace, Hyde-park, W.*
1861		Brodie, William, Esq. *Eastbourne, Sussex.*
1874		Brodribb, Wm. B., Esq. *The Bank of Australasia, Threadneedle-street, E.C.*
1863		*Brodrick, The Hon. George C. 32A, *Mount-street, W.*
1875		Brooke, Capt. W. Saurin (Beng. Staff Corps). 39, *Chepstow-villas, Bayswater, W.; and East India United Service Club, S.W.*
1874		Brooke, Chas., Esq. (Rajah of Sarawak). 15, *Queen-street, Mayfair, W.*
1864		*Brooke, Sir Victor A., Bart. *Colebrooke-park, Co. Fermanagh, Ireland.*
1872	350	Brookes, Clifford J., Esq. *The Grange, Nightingale-lane, Clapham-common, S.E.*
1862		Brookes, Thomas, Esq. *Mattock-lane, Ealing, W.*
1856		*Brooking, George Thomas, Esq. 33, *Sussex-gardens, Hyde-park, W.*
1856		*Brooking, Marmaduke Hart, Esq. 11, *Montagu-place, Bryanston-square, W.*

Year of Election.		
1870		*Brooks, Wm. Cunliffe, Esq., M.P., M.A., F.S.A., &c. 5, *Grosvenor-square, S.W.; Barlow-hall, near Manchester; and Forest of Glen-Tanar, Aboyne, Aberdeenshire.*
1863		*Broughall, William, Esq. *Broadwater, Down, Tunbridge-wells.*
1868		*Brown, Colonel David (Madras Staff Corps). *India.*
1856		*Brown, Daniel, Esq. *The Elms, Larkhall-rise, Clapham, S.*
1864		Brown, Edwin, Esq., F.G.S. *Burton-on-Trent.*
1860		Brown, James, Esq. *Rossington, Yorkshire.*
1874	360	Brown, J. B. Esq. 90, *Cannon-street, E.C.; and Bromley, Kent.*
1865		*Brown, James R., Esq., F.R.S.N.A. Copenhagen. 84, *Caversham-road, N.W.*
1861		*Brown, John Allen, Esq. *Dahlwell-lodge, Kent-gardens, Ealing, W.*
1874		Brown, Rev. Dixon. 28, *Queen's-gate, S. Kensington.*
1867		Brown, Richard, Esq., C.E. 115, *Lansdowne-road, Notting-hill, W.*
1867		Brown, Robert, Esq. 4, *Gladstone-terrace, Hope-park, Edinburgh.*
1858		*Brown, Thomas, Esq. 8, *Hyde-park-terrace, Hyde-park, W.*
1859		Brown, William, Esq. *Loat's-road, Clapham-park, S.W.*
1863		Browne, H. H., Esq. *Moor-close, Binfield, Bracknell.*
1858		*Browne, John H., Esq. *Montpellier-lawn, Cheltenham.*
1869	370	Browne, Samuel Woolcott, Esq. 58, *Porchester-terrace, Hyde-park, W.*
1864		*Browne, Captain Wade. 35, *Charles-street, Berkeley-square, W.*
1874		Browne, Walter Raleigh, Esq., C.E. *Savile Club, 15, Savile-row, W.*
1858		Browne, William J., Esq. *Merly-house, Wimborne, Dorsetshire.*
1870		Browne, Wm. A. Morgan, Esq. 15, *George-street, Hanover-square, W.*
1869		Browning, G. F., Esq. 25, *Longton-grove, Sydenham.*
1852		Browning, H., Esq. 73, *Grosvenor-street, Grosvenor-square, W.; and Old Warden-park, Biggleswade.*
1856		*Browning, Thomas, Esq. 6, *Whitehall, S.W.*
1874		Bruce, Alex. M^cCrae, Esq. 30, *Oxford-road, Kilburn, W.*
1863		Brunton, John, Esq., M.I.C.E., F.G.S. 13A, *Great George-street, S.W.*
1873	380	Brunton, R. H., Esq., F.G.S., &c. 1, *Oxford-villas, Balham, S.W.*
1856		Bryant, Walter, Esq., M.D., F.R.C.S. 23A, *Sussex-square, Hyde-park-gardens, W.*
1867		*Buccleuch, His Grace the Duke of, K.G., F.R.S. *Dalkeith-palace, near Edinburgh; and Montagu-house, Whitehall, S.W.*
1874		Buchanan, R. Dunlop, Esq. 16, *Porchester-terrace, W.*
1874		*Buchanan, Thos. Ryburn, Esq. *All Souls' College, Oxford.*
1869		Buckley, John, Esq. *Care of Messrs. Dalgety, Du Croz, and Co., 52, Lombard-street, E.C.*
1863		Budd, J. Palmer, Esq. *Ynisdaren, near Swansea.*
1867		*Bulger, Major George Ernest, F.L.S., 10th Foot. *Colchester, Essex.*
1868		*Bull, William, Esq., F.L.S. *King's-road, Chelsea, S.W.*
1865		Buller, Sir Edward M., Bart., M.P. *Old Palace-yard, S.W.; and Dilhorn-hall, Cheadle, Staffordshire.*
1869	390	Buller, Walter L., Esq., F.L.S. 7, *Westminster-chambers, Victoria-st., S.W.*
1863		Bullock, Captain Charles J., R.N. *Hydrographic-office, S.W.*

Year of Election.	
1860	*Bunbury, Sir Charles James Fox, Bart., F.R.S. *Barton-hall, Bury St. Edmund's.*
1839	Bunbury, E. H., Esq., M.A. 35, *St. James's-street, S.W.*
1863	Bundock, F., Esq. *Windham Club, S.W.*
1874	Burch, Isaac Howe, Esq. *Burlington-chambers,* 180, *Piccadilly, W.*
1861	Burges, William, Esq. *Fethard, Co. Tipperary.*
1866	*Burgess, James, Esq., M.R.A.S., Archæological Reporter, &c., to Government. *Bombay.* 8, *Merchiston-terrace, Edinburgh. Care of Messrs. Trübner Ludgate-hill, E.C.*
1875	Burgoyne, John, Esq. *Wood-thorpe, Stone Bridge Park, Willesden.*
1871	*Burke, Samuel Constantine, Esq. 34, *Harbour-street, Kingston, Jamaica.*
1864	400 Burn, Robert, Esq. 5, *Clifton-place, Sussex-square, W.*
1872	Burne, Lieut.-Colonel O. F. *India-office, S.W.*
1871	Burney, Commr. Chas., R.N., *Superintendent Greenwich Hospital Schools, S.E.*
1863	*Burns, John, Esq. *Castle Wemyss, by Greenock, N.B.*
1861	*Burr, Higford, Esq. 23, *Eaton-place, S.W.; and Aldermaston-court, Berkshire.*
1872	Burrows, Sir J. Cordy. 62, *Old Steine, Brighton.*
1857	Burstal, Captain E., R.N. 9, *Park-villas, Lower Norwood, S.E.*
1872	Burt, Charles, Esq. *Friars'-Stile-lodge, Richmond-hill.*
1830	*Burton, Alfred, Esq. 64, *Marina, St. Leonard's.*
1833	*Burton, Decimus, Esq., F.R.S. 1, *Gloucester-houses, Gloucester-crescent, W.*
1859	410*Burton, Capt. Richd. Fras. *Athenæum Club;* 14, *Montagu-place, Montagu-square, W. Care of R. Arundell, Esq., Admiralty, Spring-gardens, S.W.*
1869	Burton, William Samuel, Esq. *South-villa, Regent's-park, N.W.*
1858	Bury, William Coutts, Viscount. 48, *Rutland-gate, S.W.*
1861	Bush, Rev. Robert Wheler, M.A. 29, *Milner-square, Islington, N.*
1874	Bushell, Dr. Nathaniel. *Prince's-park School, Liverpool.*
1874	Bushell, Dr. S. W., M.D. *Poulton, Wingham, Kent.*
1873	Busk, Capt. Hans, D.L., LL.D., F.R.S., Hon. D.C.L. Oxford. 21, *Ashley-place, S.W.; and United University Club.*
1868	Busk, William, Esq., M.C.P., &c. 28, *Bessborough-gardens, S.W.*
1861	Butler, Charles, Esq. 3, *Connaught-place, Hyde-park, W.*
1867	Butler, E. Dundas, Esq. *Geographical Department, British Museum, W.C.*
1860	420*Butler, Rev. Thomas. *Rector of Langar, Nottinghamshire.*
1871	Butler, Major W. F., 69th Regiment.
1870	Butter, Donald, Esq., M.D., &c. *Hazelwood, Church-road, Upper Norwood, S.E.*
1870	Buxton, Francis W., Esq., B.A. 15, *Eaton-place, S.W.*
1869	Buxton, Henry Edmund, Esq., B.A. *Bank-house, Great Yarmouth, Norfolk.*
1873	Buxton, John H., Esq. *Brewery, Spitalfields, E.C.*
1858	*Buxton, Sir Thomas Fowell, Bart. 14, *Grosvenor-crescent, W.; and Warlies, Waltham-abbey, Essex.*
1873	*Bykovski, Gryf Jaxa, Esq. *Gryf Park, Viesna Bojanov, near Bobruish, Russia.*

Year of Election.	
1866	*Caldbeck, Captain J. B. (P. and O. Sup. at Aden). 122, *Leadenhall-street, E.C. Care of Mrs. Caldbeck, Sunnieside*, 21, *Highbury-hill, N.*
1861	Calthorpe, The Hon. Augustus Gough. 33, *Grosvenor-square, W.*
1855	430 *Calthorpe, F. H. Gough, Lord. 33, *Grosvenor-square, W.*
1854	Calvert, Frederic, Esq., Q.C. 38, *Upper Grosvenor-street, W.*
1871	*Cama, Dorabjee Pestronjee, Esq. 3 *and* 4, *Winchester-street-buildings, E.C.*
1861	Cameron, Donald, Esq., M.P. *Auchnacarry, Inverness-shire.*
1872	Cameron, Capt. Donald R., R.A. 4, *Campden-grove, Kensington, W.*
1858	*Cameron, Major-General Sir Duncan Alexander, R.E., C.B. *New Zealand.*
1873	Cameron, Henry Lovett, Esq. 25, *Granville-place, Portman-square, W.*
1864	Cameron, J., Esq. 32, *Great St. Helen's, E.C.*
1866	Cameron, R. W., Esq. *P.O. Box* 1676, *New York. Care of Messrs. Brooks and Co., St. Peter's-chambers, Cornhill, E.C.*
1871	*Campbell, Allan, Esq. *Melbourne Club, Melbourne.*
1873	440 Campbell, C. H., Esq. 10 *Eaton-place, S.W.*
1866	Campbell, Sir George, K.C.S.I., M.P., D.C.L. 13, *Cornwall-gardens, South Kensington, W.; and Athenæum Club, S.W.*
1844	*Campbell, James, Esq. *Grove-house, Hendon, Middlesex; and* 37, *Seymour-street, W.*
1857	Campbell, James, Esq., Surgeon R.N. *The Grange, Chigwell-row, N.E.*
1834	*Campbell, James, Esq., jun. *Hampton-court-green, S.W.*
1863	*Campbell, James Duncan, Esq. *Peking.* 8, *Storey's-gate, St. James's-park, W.*
1869	Campbell, Robert, Esq., J.P. 31, *Lowndes-square, S.W.; and Buscot-park, Lechlade, Gloucestershire.*
1872	Campbell, Robert, Esq. *Lednock-bank, Comrie, Perthshire.*
1872	Campbell, William, Esq. *New Club, Glasgow.*
1856	Campbell-Johnston, A. R., Esq., F.R.S. 84, *St. George's-square, S.W.*
1871	450 Campos, Dr. J. B. Gonsalvez. *Maranham, Brazil.*
1866	Canning, Sir Samuel, C.E. *The Manor-house, Abbots Langley, near Watford, Herts.*
1864	Cannon, John Wm., Esq. *Castle-grove, Tuam.*
1857	Cannon, Lieut.-General R. 5, *Park-villas, Folkestone.*
1873	*Cardwell, Edward H., Esq. 11, *Cromwell-place, S. Kensington, W.; Oxford and Cambridge and Garrick Clubs.*
1853	*Cardwell, Viscount. 74, *Eaton-square, S.W.*
1863	*Carew, R. Russell, Esq., J.P. *Carpenders-park, Watford, Herts; and Oriental Club, W.*
1873	Carey, Lieutenant H. C. (late I.N.). *Alma-road, Southport.*
1869	Carey, Rev. Tupper. *Fifield, Bavant, Salisbury; and* 15, *Hyde-park-gardens, W.*
1872	Carfrae, John, Esq. 31, *St. Swithin's-lane, E.C.; and Junior Conservative Club, King-street, St. James's.*
1862	460 Cargill, John, Esq., Member of the Legislative Assembly of New Zealand and Legislative Council of Otago. *Dunedin, Otago, New Zealand. Care of Messrs. Cargill, Joachim and Co.*, 28, *Cornhill, E.C.*
1863	*Cargill, Wm. W., Esq. 4, *Connaught-place, Hyde-park, W.*

Year of Election.		
1873		Carillon, John Wilson, Esq., F.S.A., F.S.S., &c. *Wormhill, Buxton.*
1870		Carleton, Colonel Dudley. 42, *Berkeley-square, W.*
1858		Carlingford, Lord. 7, *Carlton-gardens, S.W.*
1864		*Carmichael, L. M., Esq., M.A., 5th Lancers. *Oxford and Cambridge Club, S.W.*
1874		Carnegie, Patrick, Esq. *Hazlewood, Upper Norwood; and Oriental Club, Hanover-square, W.*
1865		*Carnegie, David, Esq. *Eastbury, by Watford, Herts.*
1863		Carnegie, Commander the Hon. J., R.N. 26, *Pall-mall, S.W.*
1869		Carr, William, Esq. *Dene-park, near Tunbridge.*
1861	470	Carter, Lieut.-Colonel Hugh Bonham-, Coldstream Guards. *Guards' Club, S.W.; and 1, Carlisle-place, Victoria-street, S.W.*
1868		Carter, Captain Thomas Tupper, R.E. *Care of Messrs. H. S. King and Co., 45, Pall-mall.*
1873		Carter, Theodore, Esq. 10, *Hanover-street, Rye-lane, S.E.*
1857		Cartwright, Col. Henry, Grenadier Guards, M.P. *Eydon-hall, Banbury.*
1874		Cartwright, William, Esq. *Care of Office of Chinese Customs, 8, Storey's-gate, St. James's-park, S.W.*
1860		*Carver, Rev. Alfred J., D.D., Master of Dulwich College. *Dulwich, S.E.*
1869		Casberd-Boteler, Commr. W. J., R.N. *The Elms, Taplow; and Naval and Military Club, Piccadilly, W.*
1858		Casella, Louis P., Esq. 147, *Holborn-bars, E.C.; and South-grove, Highgate, N.*
1875		Cassels, Andrew, Esq. (Member of Council of India). 51, *Cleveland-square, Westbourne-terrace, W.*
1874		Cassiani, Chas. Joseph, Esq. 12, *George-street, Portman-square, W.*
1873	480	Cathcart, Major Andrew. 16, *Grosvenor-street, S.W.*
1872		Caton, R. Redmond, Esq., F.S.A. *Union Club; and Binbrook-house, Market-manor, Lincolnshire.*
1872		Cattley, Edward, Esq. 34, *Woburn-square; and St. Petersburg.*
1860		Cave, Amos, Esq. *Grove-house, Belvedere, Kent.*
1857		Cave, Captain Laurence Trent. 75, *Chester-square, W.*
1858		Cave, Right Hon. Stephen, M.P. 35, *Wilton-place, S.W.*
1869		Cayley, Dr. Henry.
1873		Chadwick, Jesse, Esq. 6 *Litchurch-terrace, Osmaston-road, Derby.*
1874		Chadwick, Jno. O., Esq. 46, *Bolton-road, St. John's-wood, N.W.*
1863		Challis, John Henry, Esq. *Reform Club, S.W.*
1871	490	*Chalmer, Lieut. Reginald, 60th Royal Rifles. *Peshawur, East Indies.*
1865		Chambers, Charles Harcourt, Esq., M.A. 2, *Chesham-place, S.W.*
1874		Champain, Major J. U. Bateman, R.E. *Chisholm-lodge, Queen's-road, Richmond.*
1858		Champion, John Francis, Esq. *High-street, Shrewsbury.*
1866		*Chandless, William, Esq. 5, *Portman-street, Oxford-street, W.*
1875		Chapelle, Count de la. 1, *Howley-place, Maida-hill, W.*
1870		Chapman, Capt. E. F., R.A. *Care of Mrs. Henry Chapman, Woodford, Essex.*
1863		*Chapman, Spencer, Esq. *Roehampton, S.W.*
1870		Charles, Rev. D., B.A. (Oxon), D.D. *University College, Aberystwith, South Wales.*

Year of Election.

1861 Charnock, Richard Stephen, Esq., PH.DR., F.S.A. 2, *Verulam-buildings, Gray's-inn, W.C.; and The Grove, Hammersmith.*

1875 500 Chater, Geo., junr., Esq. 41, *Porchester-square, Hyde-park, W.*

1872 Chatwood, Samuel, Esq. 5, *Wentworth-place, Bolton.*

1873 Chauntrell, Fred Dundas, Esq. 63, *Lincoln's-inn-fields, W.C.*

1864 Cheadle, Walter, Esq., B.A., M.D. Camb. 2, *Hyde-park-place, Cumberland-gate, W.*

1873 Cheetham, Samuel, Esq. 11, *Rumford-place, Liverpool.*

1855 Cheshire, Edward, Esq. 3, *Vanbrugh-park, Blackheath, S.E.; and Conservative Club, S.W.*

1858 Chetwode, Augustus L., Esq. 3, *Charles-street, Lowndes-square, S.W.; and Chilton-house, Thame, Oxfordshire.*

1870 Chichester, Sir Bruce, Bart. *Arlington-court, Barnstaple.*

1858 Childers, Right Hon. Hugh C. E., M.P. 17, *Prince's-gardens, W.; and Australia.*

1856 Childers, John Walbanke, Esq. *Cantley-hall, near Doncaster.*

1857 510 *Chimmo, Commr. William, R.N. *Park-house, Weymouth.*

1872 Chinery, D., Esq., Consul-General for Liberia. 30, *Gracechurch-street, E.C.*

1869 Chinnock, Frederick George, Esq. 86, *Cornwall-gardens, Queen's-gate, W.*

1874 *Cholmley, Harry Walter, Esq. *Howsham, near York.*

1872 Christie, James Alexander, Esq. *Flushing, Falmouth.*

1872 Christie, T. Beath, Esq., M.D. *Ealing.*

1871 Church, Colonel Geo. Earl. *Care of J. W. Barry, Esq.*, 19, *Great Winchester-street, E.C.*

1830 *Church, W. H., Esq.

1849 Churchill, Lord Alfred Spencer. 16, *Rutland-gate, S.W.*

1856 Churchill, Charles, Esq. *Weybridge-park, Surrey.*

1870 520 Clapton, Edward, Esq., M.D., &c. *St. Thomas's-street, Southwark, S.E.*

1863 Clark, Lieut. Alex. J. 14, *St. James's-square, S.W.; and Eveswell-house, Maindee, Newport, Monmouthshire.*

1870 Clark, Charles, Esq. 20, *Belmont-park, Lee, Kent, S.E.*

1872 Clark, George Thomas, Esq. *Dowlais-house, Dowlais.*

1873 Clark, Sir John, Bart. 38, *Cornwall-gardens, W.; and Tillypronie, Aboyne, Aberdeenshire.*

1868 Clark, John Gilchrist, Esq. *Speddock, Dumfries, Dumfriesshire.*

1862 Clark, J. Latimer, Esq. 5, *Westminster-chambers, Victoria-street, S.W.; and Beechmont, Dulwich, S.E.*

1874 *Clark, Mathew E., Esq. 18, *Granville-place, Portman-square, W.*

1870 Clark, Robert, Esq. 46, *Chepstow-villas, Bayswater, W.*

1868 Clark, William, Esq. *The Cedars, South Norwood.*

1859 530 Clark, Rev. W. Geo., M.A. *Trinity College, Cambridge.*

1865 Clark, W. H., Esq. 6, *Leinster-terrace, Hyde-park, W.*

1874 *Clark-Kennedy, Alexander W. M., Esq., F.Z.S. (Coldstream Guards). *Guards' Club, Pall-mall, S.W.; 14, Prince's-gardens, S.W.; and Knockgray, County Kirkcudbright, N.B.*

Year of Election.	
1859	Clarke, Col. A., R.E. *Army and Navy Club, S.W.*
1874	Clarke, Captain F. C. H., R.A. *Adair-house, St. James's-square, S.W.*
1872	Clarke, Joseph, Esq. *North-hill-villa, Highgate, N.*
1855	*Clarke, Rev. W. B., M.A. *Sydney, New South Wales. Care of Messrs. Trübner, Ludgate-hill, E.C.*
1868	Clarke, W., Esq. 44, *Ladbroke-grove, W.*
1862	Claude, Eugène, Esq. *Villa Helvetia, Carlton-road, Tufnell-park, N.*
1863	Clayton, Captain John W., late 15th Hussars. 14, *Portman-square, W.*
1866	540 *Cleghorn, Hugh, Esq., M.D. *Stravithy, St. Andrew's.*
1871	Cleghorn, John, Esq., M.R.S., M.S.A., &c. 3, *Spring-gardens, S.W.*
1863	Clements, Rev. H. G. *United University Club, S.W.*
1870	Clements, Robert George, Esq. 97, *Victoria-park-road, E.*
1860	Clerk, Captain Claude. *Military Prison, Aldershot, Hants.*
1858	Clermont, Thomas, Lord. 35, *Hill-street, Berkeley-square, W.; and Ravensdale-park, Newry.*
1845	*Cleveland, His Grace the Duke of. *Cleveland-house, 17, St. James's-square, S.W.*
1861	Clifford, Sir Charles. *Hatherton-hall, Cannock, Staffordshire.*
1858	Clifford, Charles Cavendish, Esq. *House of Lords, S.W.*
1871	Clifford, Henry, Esq., C.E. 1, *Lansdown-place, Blackheath, S.E.*
1866	550 Clinton, Lord Edward. *Army and Navy Club, S.W.*
1865	Clipperton, Robert Charles, Esq., H.B.M. Consul. *Nantes.*
1875	Clirehugh, W. P., Esq. 7, *Strathmore-gardens, Campden-hill, W.*
1856	Clive, Rev. Archer. *Whitfield, Hereford.*
1863	Clowes, E., Esq. *Salisbury-square, Fleet-street, E.C.*
1874	Clowes, Capt. Frederic, 30th Regiment. *Portsdown Fort, Cosham, Hants.*
1854	Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.E.; Charing-cross, S.W.; and Surbiton, Surrey.*
1854	Clowes, William, Esq. *Duke-street, Stamford-street, Blackfriars, S.E.; Charing-cross, S.W.; and* 51, *Gloucester-terrace, Hyde-park, W.*
1861	Clowes, William Charles Knight, Esq., M.A. *Duke-street, Stamford-street, Blackfriars, S.E.; and Surbiton, Surrey.*
1874	Clutterbuck, Robert, Esq., J.P. 8, *Great Cumberland-place, W.*
1874	560 Coard, Philip Aldridge, Esq. 13, *St. Mark's-square, Sandringham-road, West Hackney, E.*
1852	Cobbold, John Chevalier, Esq. *Athenæum Club, S.W.; and Ipswich, Suffolk.*
1859	Cochrane, Rear-Admiral the Hon. A., C.B. *Junior United Service Club, S.W.*
1873	*Cochrane, Kenneth, Esq., *Elmbank, Galashiels, N.B.*
1868	Cock, Edward, Esq. *Kingston-on-Thames.*
1869	*Cockburn, Captain James George, 6th Regiment. *Guernsey.*
1862	Cockerton, Richard, Esq. *Cornwall-gardens, South Kensington, W.*
1862	*Cockle, Captain George. 9, *Bolton-gardens, South Kensington, W.*
1859	Cocks, Colonel C. Lygon (Coldstream Guards). *Treverbyn-Vean, Liskeard, Cornwall.*
1865	Cocks, Major Octavius Yorke. 86, *Park-street, Grosvenor-square, W.*

Year of Election.	
1841	570 *Cocks, Reginald Thistlethwayte, Esq. 43, *Charing-cross, S.W.; and 29, Stanhope-gardens, South Kensington, S.W.*
1871	*Cockshott, Arthur, Esq., M.A. *Eton College.*
1873	Codrington, General Sir William, G.C.B. 110, *Eaton-square, S.W.*
1872	*Coe, Rev. C. C. *Highfield, Bolton-le-Moors.*
1857	Coghlan, Edward, Esq. *Training-institution, Gray's-inn-road, W.C.*
1861	Coghlan, J., Esq., Engr.-in-Chief to the Government. *Buenos Ayres. Care of H. C. Forde, Esq.,* 6, *Duke-street, Adelphi, W.C.*
1862	Coghlan, Lieut.-Gen. Sir William M., K.C.B., R.A. *Ramsgate, Kent.*
1865	*Colchester, Reginald Charles Edward, Lord. 68, *Eaton-place, S.W.*
1868	Cole, William H., Esq. 64, *Portland-place, W.*
1867	Colebrook, John, Esq. 15, *Hans-place, Chelsea, S.W.*
1841	580 *Colebrooke, Sir Thomas Edward, Bart., F.R.A.S. 37, *South-st., Park-lane, W.*
1854	Coleman, Everard Home, Esq., F.R.A.S. *Registry and Record Office, Adelaide-place, London-bridge, E.C.*
1848	Coles, Charles, Esq. 86, *Great Tower-street, E.C.*
1873	Coles, Jno., Esq. *Mitcham, Surrey.*
1856	*Collett, William Rickford, Esq. *Carlton Club, S.W.*
1867	Collier, C. T., Esq., Barrister of the Middle Temple.
1872	Collingwood, Lieut. W. *India-office, S.W.*
1858	Collinson, Henry, Esq. 7, *Devonshire-place, Portland-place, W.*
1866	Collinson, John, Esq., C.E. 37, *Porchester-terrace, Hyde-park, W.*
1855	Collinson, Vice-Admiral Sir Richard, K.C.B. *Haven-lodge, Ealing, W.; and United Service Club, S.W.*
1871	590 *Collis, Capt. Gustavus W. Berry, 6th Royal Regiment. *Care of Mrs. Collis, Barton-terrace, Dawlish, Devon.*
1875	Colls, Benjamin, Esq. *Sutton, Surrey.*
1862	Colquhoun, Sir Patrick M. de, Q.C., LL.D. 2, *King's-bench-walk, Temple, E.C.*
1869	Colvill, William H., Esq., Surg. H.M. Ind. Army. *Lawn-bank, Hampstead; and Baghdad.*
1861	*Colville, Charles John, Lord. 42, *Eaton-place, S.W.*
1865	Colvin, Binny J., Esq. 71, *Old Broad-street, E.C.*
1868	Colvin, Captain W. B., Royal Fusiliers. *Care of Messrs. Cox and Co., Craig's court, S.W.*
1868	Combe, Lieut. B. A.
1871	Comber, Colonel A. K. (Dep.-Commd. of Assam, Goalpara). *Care of Messrs. Woodhead.*
1864	Commerell, Admiral Sir J. E., V.C., K.C.B. *Alverbank, Alverstoke, Hants.*
1873	600 Compiègne, Marquis de. 10, *Rue de Clichy, Paris.*
1864	Conder, Rev. John. *Hallbrooke-house, New Wandsworth, S.W.*
1861	Constable, Captain Chas. Golding, I.N. 6, *Harley-road, St. John's-wood, N.W.*
1872	*Cook, F. L., Esq. 3, *Cromwell-place, South Kensington.*
1868	Cook, H., Esq., M.D., &c. *Care of Messrs. Forbes and Co.,* 12, *Leadenhall-street, E.C.*

Year of Election.		
1871		Cook, Henry, Esq. *Grammar-school, Wantage, Berks.*
1859		Cooke, Lieut.-Col. A. C., R.E. *Bermuda.*
1863		*Cooke, E. W., Esq., A.R.A., F.R.S., F.L.S., F.Z.S., F.G.S., Accad. Bell. Art. Venet. et Holm. Socius. *Glen-Andred, Groombridge, Sussex; and Athenæum Club, S.W.*
1856		Cooke, John George, Esq. 25, *Austin-friars, Old Broad-street, E.C.*
1860		Cooke, Nathaniel, Esq. 5, *Ladbroke-terrace, Notting-hill, W.*
1852	610	Cooke, Robt. F., Esq. 50, *Albemarle-street, W.*
1860		Cooke, William Henry, Esq., Q.C. 4, *Elm-court, Temple, E.C.*
1874		Cooke, Capt. W. S., 22nd Regiment. *Adair-house, St. James's-square, S.W.*
1872		*Cookson, F., Esq. *Teddington-hall, Teddington.*
1830		Cooley, William Desborough, Esq. 13, *College-place, Camden-town, N.W.*
1872		Cooper, Alfred, Esq. 9, *Henrietta-street, Cavendish-square, W.*
1872		Cooper, Commr. B. J., R.N. 31, *Kensington-square, W.*
1862		Cooper, Sir Daniel. 20, *Prince's-gardens, South Kensington, S.W.*
1856		Cooper, Lieut.-Col. Edward H., Grenadier Guards. 42, *Portman-square, W.*
1860		Cooper, Lieut.-Col. Joshua H., 7th Fusiliers. *Dunboden, Mullingar.*
1873	620	Cooper, Thos. T., Esq. *Care of Messrs. H. S. King and Co.*, 65, *Cornhill, E.C.*
1874		Cooper William White, Esq. 19, *Berkeley-square, W.*
1857		*Coote, Rear-Admiral Robert, C.B. *Admiralty-house, Queenstown, Ireland.*
1871		Cope, Henry, Esq. 19, *Bedford-place, Russell-square, W.C.*
1874		Copland-Crawford, Lieut.-Gen. R. F., R.A. *Sudbury-lodge, Harrow, Middlesex.*
1853		Copley, Sir Joseph William, Bart. *Sprotborough, Doncaster.*
1864		Cork and Orrery, Earl of. 1, *Grafton-street, W.*
1868		Cork, Nathaniel, Esq. *Grennel-house, Sutton, Surrey.*
1868		Corner, William Mead, Esq. 10, *Enmore-park, South Norwood; and* 105, *Leadenhall-street, E.C.*
1868		*Cornish-Brown, Charles, Esq. *Clifton-lodge, Farquhar-road, Norwood, S.E.*
1865	630	Cornthwaite, Rev. T., M.A. *Forest, Walthamstow.*
1860		Cornwell, James, Esq., PH.D. *Purbrook, Crescent-wood-road, Sydenham-hill, S.E.*
1868		Cory, Frederic C., Esq., M.D. *Portland-villa, Buckhurst-hill, Essex; and Nassau-place, Commercial-road, E.*
1873		Cosson, Emilius Albert de, Esq.
1874		*Cosson, the Baron de. 38, *Rue St. Dominique, St. Germain, Paris.*
1869		Coster, Guillaume F., Esq. 11, *Park-crescent, Regent's-park, N.W.*
1853		*Cosway, William Halliday, Esq. *Oxford and Cambridge Club, S.W.*
1875		Cotesworth, Wm., Esq. *Cowdenknowes, Roxburghshire, N.B.*
1875		*Cotterill, H. B., Esq., B.A. *Haileybury College, Herts.*
1875		Cotton, General Fredk., R.E. *Athenæum Club, Pall-mall.*
1856	640	Cottesloe, Right Hon. Lord. 20, *Eaton-place, S.W.*
1873		*Cottrill, Robert Alfred, Esq. *Stanwell-house, Stanwell, near Staines.*
1873		Courtenay, J. Irving, Esq. 3, *Plowden-buildings, Temple, E.C.*

Year of Election.

1863 Courtenay, L. W., Esq. *British Post-office, Constantinople. Care of R. Wood, Esq., 139, Fleet-street.*

1874 *Courtney, Henry Nicholas, Esq., B.A. 2, *Little Stanhope-street, Mayfair, W.; and National Club, Whitehall-gardens, S.W.*

1875 Covington, Rev. W., Vicar of St. Luke's. *Shepherd's-bush.*

1862 Coward, William, Esq. *Rock-bank, Lordship-lane, Dulwich, S.E.*

1857 *Cowell, Lieut.-Col. Sir J. C., K.C.B., R.E. *Buckingham-palace, S.W.*

1854 Cowley, Norman, Esq. 4, *Montagu-place, Montagu-square, W.*

1871 Cowper, Henry Aug. (H.M. Com. Puerto Rico). *Care of Messrs. Woodhead, 44, Charing-cross, S.W.*

1862 650 *Cowper, Sedgwick S., Esq.

1874 Coxon, Samuel Bailey, Esq., F.G.S. *Usworth Hall, Durham.*

1865 Coysh, John S., Esq. *Levant-house, St. Helen's-place, E.C.*

1870 *Cracroft, Bernard, Esq., M.A. Trin. Coll. Camb. *Oxford and Cambridge Club, S.W.; and 8, Savile-row, S.W.*

1867 Crane, Leonard, Esq., M.D. 7, *Albemarle-street, W.*

1873 Craufurd, George Ponsonby, Esq. *Buenos Ayres; and Travellers' Club, S.W.*

1857 Craufurd, Lieut.-General James Robertson, Grenadier Guards. *Travellers' Club, S.W.; and 36, Prince's-gardens, W.*

1875 Craven, Alfred, Esq. *Henwood-bank, Sharrow, Sheffield.*

1848 Crawford, Robert Wigram, Esq. 71, *Old Broad-street, E.C.*

1866 Crawfurd, O. J., Esq. *Athenæum Club, S.W.*

1873 660 Creswell, Alf. Aug., Esq. 1, *Capel-court, E.C.; and Radford-vicarage, Notts.*

1861 Creswell, Rev. Samuel Francis, B.D., F.R.A.S. *Principal of the High School, Dublin.*

1859 *Creyke, Captain Richard Boynton, R.N. *Gristhorpe-hall, Filey, Yorkshire.*

1856 Croker, T. F. Dillon, Esq. 19, *Pelham-place, Brompton, S.W.*

1864 Croll, A. A., Esq., C.E. *Southwood, Southwood-lane, Highgate.*

1868 Croll, Alex., Esq. *Mavis-bank, Grange-road, Upper Norwood.*

1860 *Croskey, J. Rodney, Esq. 43, *Portsdown-road, Maida-hill, W.; and 30, Parliament-street, W.*

1860 Crosse, Rev. Thomas, D.C.L., M.R.A.S. *Hastings.*

1862 Crossman, James Hiscutt, Esq. *Rolls-park, Chigwell, Essex.*

1875 Crossman, Lieut.-Colonel W., R.E. *Horse Guards, S.W.*

1863 670 *Crowder, Thos. Mosley, Esq., M.A. *Thornton-hall, Bedale, Yorkshire.*

1852 Crowdy, James, Esq. 17, *Serjeants'-inn, E.C.*

1874 Crowe, Francis, Esq., LL.D. 22, *Westbourne-park-road, W.*

1872 Cruikshank, Donald, Esq. *Junior Naval and Military Club,* 19, *Dover-street, W.*

1859 Cull, Richard, Esq., F.S.A. 13, *Tavistock-street, Bedford-square, W.C.*

1874 Cumming, Chas. Lennox B., Esq. (Assistant Magistrate at Calicut). *Malabar Club, Calicut. Care of Messrs. Forbes, Forbes and Co.,* 9, *King William-street, E.C.*

1857 Cumming, William Fullarton, Esq., M.D. *Athenæum Club, S.W.; and Kinellan, Edinburgh.*

Year of Election.		
1860		Cunliffe, Roger, Esq. 24, *Lombard-street, E.C.; and* 10, *Queen's-gate, South Kensington, W.*
1853		Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow, N.W.*
1862		*Cunynghame, Lieut.-Gen. Sir A. T., K.C.B. *United Service Club, Pall-mall, S.W.*
1870	680	Cunynghame, Sir Edward A., Bart. *Army and Navy Club, S.W.*
1865		Cure, Capel, Esq. 51, *Grosvenor-street, W.*
1872		Curling, Lieut. J. Jas., R.E.
1868		Currie, A. A. Hay, Esq., C.E. 18, *Acqua Sola, Genoa.*
1843		*Cursetjee, Manockjee, Esq., F.R.S.N.A. *Villa-Byculla, Bombay.*
1839		*Curtis, Timothy, Esq.
1872		Cust, Robt. Needham, Esq. 64, *St. George's-square, S.W.*
1867		Cuttance, John Fras. J., Esq. *Cleveland-house, Greville-road, Kilburn, N.W.*
1872		Czarnikow, Cæsar, Esq. 29, *Mincing-lane, E.C.*
1874		Dadson, Arthur Jas., Esq. 11, *Mark-lane, E.C.*
1863	690	*Dalgety, Fred. G., Esq. 16, *Hyde-park-terrace, W.*
1866		*Dalhousie, Right Hon. Earl of. 50, *Lancaster-gate, W.*
1864		Dallas, A. G., Esq. 3, *Ennismore-gardens, Prince's-gate, S.W.*
1870		Dallas, Sir Geo. E., Bart. *Foreign-office, Downing-street, S.W.*
1865		D'Almeida, W. B., Esq. 19, *Green-park, Bath.*
1867		Dalrymple, Geo. Elphinstone, Esq. *Logie, Elphinstone, Aberdeenshire.*
1868		Dalrymple, Capt. R. G. E.
1857		Dalton, D. Foster Grant, Esq. *Shanks-house, near Wincanton, Somerset.*
1873		Daly, Chief Justice Chas. P., LL.D. (President of the American Geographical Society, New York). 84, *Clinton-place, New York.*
1859		Dalyell, Sir Robt. Alex. Osborn, Bart. *H.M.'s Consul at Rustchuk, Bulgaria.*
1868	700	Dalziel, William R., Esq. 5, *Gresham-park, Brixton, S.W.*
1866		Damer, Lieut.-Col. Lionel S. Dawson. 2, *Chapel-street, Grosvenor-square, W.*
1874		*Daniell, Colonel E. Staines. *East India United Service Club,* 14, *St. James's-square, S.W.*
1874		Darroch, Geo. Edw., Esq. 38, *Stanhope-gardens, S.W.; and Oxford and Cambridge Club, Pall-mall, S.W.*
1838		*Darwin, Charles, Esq., M.A., F.R.S. 6, *Queen Anne-street, Cavendish-square, W.*
1874		Davidson, Duncan, Esq. 4, *Lancaster-gate, S.W.*
1874		Davidson, Col. James. *Sneinton Manor-house, Nottingham; and Carlton Club, S.W.*
1863		Davies, R. H., Esq., Chief Commissioner of Oudh, Lucknow. *Care of Messr Twining,* 215, *Strand, W.C.*
1873		Davies, Rev. R. V. Faithfull. *Trinity College, Eastbourne.*
1869		*Davies, Robert E., Esq., J.P. *Crescent-villa, Kington, near Portsmouth.*
1873	710	Davies, W. Hy. Esq. 51, *Tregunter-road, South Kensington, W.*

Year of Election.	
1866	Davis, Edmund F., Esq. 6, *Cork-street, Bond-street, W.*
1866	Davis, Frederick E., Esq. 20, *Blandford-square, N.W.*
1874	Davis, Rev. James. 7, *Adam-street, Adelphi, W.C.*
1861	Davis, Captain John Edward, R.N. *Hydrographic-office, Admiralty, S.W.*
1875	Davis, Commr. Hugh, R.N. *Army and Navy Club, Pall-mall.*
1846	Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club, S.W.; and Hollywood, near Bristol.*
1868	Davis, Richard, Esq. 9, *St. Helen's-place, E.C.*
1874	Dawes, Edwyn, Esq. *Heathfield-lodge, Surbiton.*
1840	*Dawnay, The Hon. Payan. *Beningborough-hall, Newton-upon-Ouse, Yorkshire.*
1870	720 Dawson, John Edward, Esq. *Oak-lodge, Watford, Herts.*
1875	Daymond, Rev. Charles, M.A., Principal of St. Peter's College, *Peterborough.*
1865	Debary, Rev. Thomas, M.A. 35, *Mount-street, W.*
1866	Debenham, William, Esq. 16, *Gloucester-place, Portman-square, W.*
1875	De Blaquière, Capt. Lord, R.N. *Scientific Club*, 7, *Savile-row, S.W.*
1856	De Crespigny, Lieutenant C., R.N. *Care of Messrs. King and Co.*, 65, *Cornhill, E.C.*
1865	De Laski, A., Esq. 2, *Adelaide-crescent, Brighton.*
1869	De Leon, Dr. Hananel. 26, *Redcliffe-gardens, West Brompton, S.W.*
1862	Denham, Vice-Adm. Sir Henry Mangles, F.R.S. 21, *Carlton-road, Maida-vale, W.*
1860	Denison, Alfred, Esq. 6, *Albemarle-street, W.*
1875	730 *Denny, Edward Maynard, Esq. 43, *Upper Brook-street, Grosvenor-square; and Boxhurst, Dorking.*
1872	Dent, Alfred, Esq. 29, *Chesham-street, S.W.*
1874	Dent, Clinton T., Esq. 29, *Chesham-street, S.W.*
1872	*Dent, Edward, Esq. 12, *Hyde-park-gardens, W.*
1871	Dentry, James, Esq. *The College, Margate.*
1853	*Derby, Edward Henry, Earl of, P.C., LL.D., D.C.L. 23, *St. James's-square, S.W.; and Knowsley-park, Prescot, Lancashire.*
1875	De Ricci, Jas. H., Esq. 2, *Tanfield-chambers, Temple.*
1867	De Salis, Major-Gen. Rodolph, C.B. 123, *Pall-mall, S.W.*
1875	De Salis, Wm. Fane, Esq. *Dawley-court, Uxbridge.*
1875	Desmond, Rev. H. M. Egan.
1874	740 Devas, Thomas, Esq. *Mount Ararat, Wimbledon.*
1854	*Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N.W.*
1874	Devereux, W. Cope, Esq., R.N. *Hereford-cottage, Manuel-road, W. Croydon.*
1837	*Devonshire, William Cavendish, Duke of, LL.D., D.C.L., M.A., F.R.S. *Devonshire-house, Piccadilly, W.; and Hardwicke-hall, Derbyshire.*
1853	De Wesselow, Lieut. Fras. G. Simpkinson.
1872	Dhuleep-Singh, His Highness the Maharaja. *Elvedon-hall, near Thetford.*
1870	Dibdin, Charles, Esq. 62, *Torrington-square, W.C.*
1870	Dibdin, Robert W., Esq. 62, *Torrington-square, W.C.*

Year of Election.	
1862	Dick, Captain Charles Cramond. *Elmwood, Colyford, Axminster, Devon.*
1866	*Dick, Fitzwilliam, Esq., M.P. 20, *Curzon-street, Mayfair, W.*
1861	750 Dick, Robert Kerr, Esq., Bengal Civil Service. *Oriental Club, W.*
1866	Dick, William Graeme, Esq. 29, *Leinster-square, W.*
1830	*Dickinson, Francis Henry, Esq., F.S.A. 119, *St. George's-square, Pimlico, W.; and Kingweston-park, Somerset.*
1852	Dickinson, John, Esq. *Athenæum Club, S.W.*
1854	*Dickinson, Sebastian Stewart, Esq., M.P., Barrister-at-Law. 12, *Suffolk-street, Pall-mall; and Brown's-hill, Stroud, Gloucestershire.*
1859	Dickson, A. Benson, Esq. 4, *New-square, Lincoln's-inn, W.C.*
1875	*Dickson, Oscar, Esq. *Stockholm; care of his Excellency Baron Hochschild, Great Cumberland-street, Hyde-park.*
1860	Dietz, Bernard, Esq., of Algoa Bay, 3, *Dorset-square, W.*
1859	Digby, G. Wingfield, Esq. *Sherborne-castle, Dorset.*
1860	Digby, Lieut.-Col. John Almerous. *Chalmington-house, Cattstock, Dorchester.*
1859	760 *Dilke, Sir Charles Wentworth, Bart., M.P. 76, *Sloane-street, S.W.*
1856	Dillon, The Hon. Arthur. 113, *Victoria-street, S.W.*
1864	Dimsdale, J. C., Esq. 50, *Cornhill, E.C.; and* 52, *Cleveland-square, S.W.*
1873	Dineen, Thomas, Esq. 7, *College-street, Belfast.*
1872	Divett, Edwd. Ross, Esq. *Reform Club, S.W.*
1867	Dix, Thomas, Esq. 10, *Amwell-street, W.C.*
1872	Dixon, Joseph, Esq. *Hillsbro'-hall, Sheffield.*
1861	Dixon, Lieut.-Colonel John.
1854	*Dixon, W. Hepworth, Esq., F.S.A. 6, *St. James's-terrace, St. John's-wood, N.W.*
1873	Dodd, Jno., Esq. *Tamsui, Formosa. Care of Jno. Ewart, Esq.,* 7, *Lancaster-street, Hyde-park, W.*
1854	770 Dodson, Right Hon. John George, M.P. 6, *Seamore-place, Mayfair, W.*
1867	Donald, James, Esq. *Care of Mrs. C. Liney, The Poplars, Rotherwick, Winchfield, Hants.*
1858	Donne, John, Esq. *Instow, North Devon.*
1873	Doria, Marquis Giacomo. *Genoa. Care of Kirkland, Cope, and Co.,* 23, *Salisbury-street, Strand.*
1868	Douglas, John, Esq. *Angus-lodge, Portsea.*
1870	Douglas, John, Esq.
1868	Douglas, Captain N. D. C. F. *Guards' Club, S.W.*
1875	Douglas, Lieut.-General Sir Percy Bart. *Henlade-house, Taunton, Somerset.*
1871	Douglas, Stewart, Esq. 5, *Chester-terrace, Eaton-square, S.W.*
1874	Dowling, Edward Samuel, Esq. 14, *Holland-villas-road, Kensington, W.*
1875	780 Dowling, Lieut.-Col. James Henry. *Barnwood, near Gloucester.*
1871	Down, J. H. Langdon, Esq., M.D. 39, *Welbeck-street, W.; and Normansfield, Hampton Wick.*
1853	Doyle, Sir Francis Hastings C., Bart. *Custom-house, E.C.*
1845	*Drach, Solomon Moses, Esq., F.R.A.S. 23, *Upper Barnsbury-street, N.*

Year of Election.	
1872	*Drew, Frederick, Esq. *Claremont-road, Surbiton.*
1869	Drummond, Alfred Manners, Esq. *Charing-cross, S.W.*
1865	Drummond, E. A., Esq. 2, *Bryanston-square, W.*
1846	Drury, Rear-Admiral Byron, R.N. 4, *Cambridge-villas, Cheltenham.*
1851	*Du Cane, Major Francis, R.E. *Brentwood, Essex.*
1851	*Ducie, Henry John, Earl of, F.R.S. 16, *Portman-square, S.W.*
1859	790 Duckworth, Henry, Esq. *Seafield, Waterloo, near Liverpool.*
1860	*Duff, Mountstuart Elphinstone Grant, Esq., M.P. 4, *Queen's-gate-gardens, South Kensington, W.*
1868	Duff, Wm. Pirie, Esq. *Calcutta. Care of Messrs. John Watson and Co.*, 34, *Fenchurch-street, E.C.*
1857	*Dufferin, Right Hon. Fredk. Temple Hamilton-Blackwood, Earl of, K.P., K.C.B., F.R.S. *Clandeboye, near Belfast, Ireland.*
1866	*Dugdale, Captain Henry Charles G. *Merevale-hall, Atherstone, Warwick.*
1867	*Dugdale, John, Esq. 1, *Hyde-park-gardens and Llwyn, Llanfyllin, Oswestry.*
1868	Dunbar, John Samuel A., Esq. 28, *Pembridge-crescent, Bayswater, W.; and* 4, *Barnard's-inn, Holborn.*
1863	Duncan, Major Francis, R.A., M.A., F.R.S. *The Scientific Club,* 7, *Savile-row, W.*
1861	*Duncan, George, Esq. 45, *Gordon-square, W.C.*
1840	*Dundas, Right Hon. Sir David, Q.C. 13, *King's-Bench-walk, Temple, E.C.; and Ochtertyre, Stirling.*
1860	800 Dunell, Henry James, Esq. 12, *Hyde-park-square, W.*
1873	Dunlop, Alexander Milne, Esq. 28, *Clanricarde-gardens, W.; and* 3, *Old Palace-yard, Westminster, S.W.*
1875	Dunlop, Hamilton Grant, Esq. 11, *Rockstone-place, Southampton; and Junior Carlton Club, S.W.*
1859	*Dunlop, R. H. Wallace, Esq., C.B., Indian Civil Service. 12, *Kent-gardens, Castle-hill, Ealing.*
1860	*Dunmore, Charles Adolphus Murray, Earl of. 50, *Portland-place, W.*
1868	Dunn, Captain F. J. A. *Portillon, Tours, France.*
1874	Dunn, Wm., Esq. 6, *Lime-street-square, E.C.*
1867	Dunraven, Wyndham Thos., Earl of. *Clearwell-court, Coleford, Gloucestershire.*
1875	Dunstone, J. Jno., Esq. 22, *St. George's-terrace, Caernarvon-street, Glasgow.*
1856	Duprat, Le Vicomte. *Consul-Général de Portugal,* 10, *St. Mary-Axe, E.C.*
1869	810 Durham, Edward, Esq. *City-house, Little Chester, near Derby.*
1874	Durnford, Lieut.-Colonel A. W., R.E. *Care of W. M. James, Esq.*, 8, *Lyndhurst-road, Roslyn-park, Hampstead.*
1874	*Duthie, Capt. W. H., R.A. *Woolwich, S.E.*
1865	*Dutton, F. S., Esq. *Reform Club, S.W.; and Adelaide, Australia.*
1868	Dutton, Frederick H., Esq. 11, *Cromwell-crescent, South Kensington, S.W.*
1874	Dykes, Wm. Alton, Esq. (Provost of Hamilton). *The Orchard, Hamilton, N.B.*
1870	Dymes, Daniel David, Esq. *Windham Club, S.W.; and* 9, *Mincing-lane, E.C.*

Year of Election.

1872 Eade, Isaac Broad, Esq., M.A., &c. *Kimberley-house, Falmouth.*

1856 Eardley-Wilmot, Major-Gen. F., M.R.A. 22, *Victoria-road, Clapham-common, S.W.*

1871 Earle, Arthur, Esq. *Childwall-lodge, Wavertree, near Liverpool; and Windham Club, S.W.*

1869 820 Eastwick, Edward B., Esq., F.R.S. 88, *Holland-road, Kensington, W.*

1857 Eastwick, Captain W. J. *Cuyuni, Teddington.*

1863 Eaton, F. A., Esq. *New University Club, St. James's-street, S.W.*

1862 *Eaton, H., Esq. 16, *Prince's-gate, Hyde-park, W.*

1862 *Eaton, Henry William, Esq., M.P. 16, *Prince's-gate, Hyde-park, W.*

1864 *Eaton, William Meriton, Esq. 16, *Prince's-gate, Hyde-park, W.*

1866 Eatwell, Surgeon-Major W. C. B., M.D. *Oriental Club, Hanover-square, W.*

1875 *Ebden, Charles J., Esq., B.A. 4, *Weymouth-street, W.; and St. Stephen's Club.*

1861 Eber, General F.

1862 Ebury, Lord. 107, *Park-street, Grosvenor-square, W.; and Moor-park, Herts.*

1862 830 Eden, Admiral Sir Charles, K.C.B. 9, *Queen's-gate-place, S.W.*

1858 Edge, Rev. W. J., M.A. *Benenden-vicarage, near Staplehurst, Kent.*

1874 Edgell, A. Wyatt, Esq. 11, *Portugal-street, W.*

1863 Edgeworth, M. P., Esq., BENG. C.S. *Mastrim-house, Anerley, S.*

1874 Edmonds, John Thos., Esq. *Cvinavon-house, near Pontypool, Monmouthshire.*

1867 *Edward, James, Esq. *Balruddery, by Dundee, N.B.*

1866 *Edwardes, Thomas Dyer, Esq. 5, *Hyde-park-gate, Kensington, W.*

1871 *Edwardes, Thomas Dyer, Esq., jun. 5, *Hyde-park-gate, Kensington.*

1868 Edwards, Rev. A. T., M.A. 39, *Upper Kennington-lane, S.*

1865 Edwards, G. T., Esq., M.A. 19, *Old-square, Lincoln's-Inn, W.C.*

1861 840 *Edwards, Henry, Esq., M.P. 53, *Berkeley-square, W.*

1871 Edwards, James Lyon, Esq. 7, *The Avenue, Belsize-park, Hampstead, N.W.*

1860 Edwards, Major J. B., R.E. *United Service Club, S.W. Care of Messrs. H. S. King and Co., 65, Cornhill, E.C.*

1853 Egerton, Rear-Admiral the Hon. Francis, M.P. *Devonshire-house, S.W.*

1868 Elder, A. L., Esq. *Carlisle-house, Hampstead.*

1863 *Elder, George, Esq. *Knock-castle, Ayrshire.*

1867 Eley, Charles John, Esq. *Old Brompton, S.W.*

1865 Elias, Ney, jun., Esq. 64, *Inverness-terrace, Bayswater, W.*

1870 Ellenborough, Lord. *Holly Spring, Bracknell, Berks.*

1860 Elliot, G., Esq., C.E. *The Hall, Houghton-le-Spring, near Fence Houses, Durham.*

1857 850 *Elliot, Capt. L. R. *La Muilleraye-sur-Seine, Seine Inférieure. Care of J. L. Elliot, Esq., at 64, Albany, W.*

1871 Elliot, William, Esq. 2, *De Crespigny-terrace, Denmark-hill, Camberwell, S.*

1830 *Elliott, Rev. Charles Boileau, M.A., F.R.S. *Tattingstone, Suffolk.*

1873 Ellis, Hon. Evelyn H. *Raleigh Club, Regent-street, W.*

1865 Ellis, W. E. H., Esq. *Hasfield-rectory, Gloucester; Oriental Club, W.; and Byculla Club, Bombay.*

Year of Election.

1871 Ellis, Walter J., Esq. 102, _Harley-street, Cavendish-square, W._

1874 Elmslie, Jas. A., Esq. _Manaar-house, Vanbrugh-fields, Blackheath._

1873 Elmslie, W. Stuart, Esq. _Lloyd's, E.C.; and Richmond, S.W._

1873 Elmslie, William Esq. _The Laurels, Richmond-hill, S.W._

1858 Elphinstone, Major Sir Howard C., R.E., K.C.B., V.C., C.M.G. _Buckingham-palace, S.W._

1869 860 Elsey, Colonel William. _West-lodge, Ealing, W._

1857 Elton, Sir A. H., Bart. _Athenæum Club, S.W.; and Clevedon-court, Somersetshire._

1873 *Elton, Captain Frederick. _Care of Mrs. Elton, 88, Abingdon Road, Kensington, W._

1872 Elwell, W. R. G., Esq. 8, _Beverley-road, South Penge-park, S.E._

1868 Ely, John Henry Wellington Graham Loftus, Marquis of. _Rathfarnham-castle, Dublin._

1873 Empson, Hy. Wm., Esq. _York._

1830 Enderby, Charles, Esq., F.R.S., F.L.S. _Royal Institution, Albemarle-street, W._

1860 Enfield, Edward, Esq., F.S.A. 19, _Chester-terrace, Regent's-park, N.W._

1863 Engleheart, Gardner D., Esq. _Gatton-cottage, Reigate._

1870 *Erskine, Claude J., Esq., Bombay Civil Service. 87, _Harley-street, W.; and Athenæum Club, S.W._

1852 870 Erskine, Admiral John Elphinstone. 1 _L, Albany, W.; and Lochend, Stirling, N.B._

1857 *Esmeade, G. M. M., Esq. 29, _Park-street, Grosvenor-square, W._

1872 Espinosa, Don Juan (Baron de Eldenburg). _Plaza del Inquisizion, Lima, Peru._

1874 *Evans, B. Hill, Esq. 23, _St. John's-villas, Upper Holloway, N._

1870 *Evans, Edward Bickerton, Esq. _Whitbourne-hall, near Worcester._

1857 Evans, Captain F. J. O., R.N., C.B., F.R.S., F.R.A.S. _Hydrographic-office, Admiralty, S.W._

1830 *Evans, Vice-Admiral George. 1, _New-street, Spring-gardens, S.W.; and Englefield-green, Staines._

1870 Evans, Lieut.-Colonel Henry Lloyd. 14, _St. James's-square, S.W._

1857 Evans, Thos. Wm., Esq. _Pen-y-Bryn, Duffield-road, Derby._

1830 *Evans, W., Esq.

1867 880 Evans, W. Herbert, Esq. _Forde Abbey, Chard, Dorset._

1865 Evans, Colonel William Edwyn. 55, _Seymour-street, Portman-square, W._

1861 Evelyn, Lieut.-Colonel George P. 34, _Onslow-gardens, Brompton, S.W._

1851 *Evelyn, William J., Esq., F.S.A. _Evelyn Estate-office, Evelyn-street, Deptford._

1875 Everard, Chas. Walter, Esq. (H.M. Consular Service, China). _Burgate Rectory, Diss._

1830 *Everett, James, Esq., F.S.A.

1865 Everitt, George A., Esq. _Knowle-hall, Warwickshire._

1874 Evill, William, Esq. _Lyncombe-house, St. John's-hill, Wandsworth._

1873 Ewart, John, Esq. 7, _Lancaster-street, Hyde-park, W._

1856 Ewing, J. D. Crum, Esq. 3, _Lime-street-square, E.C._

1857 890 Eyre, Edward J., Esq.

Year of Election.

1861 Eyre, George E., Esq. 59, *Lowndes-square, Brompton, S.W.*
1856 Eyre, Major-Gen. Sir Vincent, K.C.S.I. *Athenæum Club, S.W.*
1871 Eyton, Wm. Campbell, Esq. *Care of Messrs. Peele and Peele, Shrewsbury.*

1873 Fair, John, Esq. 50, *Hamilton-terrace, St. John's-wood, N.W.*
1870 Fairbridge, Charles, Esq. (Queen's Proctor). *Care of J. R. Izac, Esq., Worcester College, Oxford.*
1869 Fairfax, Captain Henry, R.N. *Army and Navy Club, S.W.*
1856 Fairholme, George Knight, Esq. *Care of Mr. Ridgway, 169, Piccadilly, W.*
1870 900 Fairland, Edwin, Esq., M.D. (Surg. 21st Hussars). *Lucknow, Oude.*
1838 Falconer, Thomas, Esq. *Usk, Monmouthshire.*
1868 Falconer, William, Esq. *Gothic-house, St. Ann's-road, Stamford-hill, N.*
1857 Falkland, Lucius Bentinck, Viscount. *Skutterskelfe, Yorkshire.*
1871 Fane, Edward, Esq. 14, *St. James's-square, S.W.*
1855 *Fanshawe, Admiral E. G. *Delrow, Watford, Herts.*
1874 Farmer, Edmund, Esq. *Lawrence, Sevenoaks, Kent.*
1873 Farmer, James, Esq. 6, *Porchester-gate, Kensington-gardens, W.*
1874 Farquhar, Walter, Esq. *Care of Messrs. Forbes, Forbes and Co., 9, King William-street, E.C.*
1868 *Farquharson, Major.-Gen. G. McB. *St. John's-villa, Cathnor-road, Shepherd's-bush, W.*
1873 Farrar, R. Bishop, Esq.
1863 *Farrer, W. Jas., Esq. 18, *Upper Brook-street, W.*
1875 910 Farrer, Hy. Richard, Esq. 42, *Lowndes-street, Belgravia, S.W.; and Green Hammerton Hall, York.*
1874 *Faulconer, Rob. Stephen, Esq. *Fairlawn, Clarence-road, Clapham-park, S.W.*
1863 *Faunthorpe, Rev. J. P., M.A. *Whitelands Training-college, Chelsea.*
1869 Fawcett, Captain Edward Boyd, M.A. *The Towers, Clevedon, Somerset.*
1869 Fawcett, Henry, Esq. *Wainsford, Lymington.*
1874 Fawssett, Frederick, Esq., M.D. *Westgate, Louth, Lincolnshire.*
1853 *Fayrer, Joseph, Esq., M.D. 16, *Granville-place, Portman-square, W.*
1858 *Fazakerley, J. N., Esq. 6, *South Eaton-place, S.W.*
1866 Felkin, William, Esq., jun., F.Z.S. 22, *Upper Talbot-street, Nottingham.*
1874 Fenn, Thomas, Esq. 14, *Bedford-square, W.C.*
1872 920 *Fenner, William A., Esq. *Thatched House Club, St. James's-street, S.W.; and Woodlands, Kenn, near Exeter.*
1875 Ferguson, Jno., Esq. 10, *Staple Inn, W.C.*
1840 *Fergusson, James, Esq., F.R.S., D.C.L. 20, *Langham-place, W.*
1860 Ferro, Don Ramon de Silva.
1871 Festing, Captain Robert, R.E. *South Kensington Museum, S.W.*

Year of Election.		
1865		Field, Hamilton, Esq. *Thornton-lodge, Thornton-road, Clapham-park, S.*
1874		Fielden, Joshua, Esq., M.P. *Nutfield Priory, Redhill, Surrey.*
1875		*Figgis, Samuel, Esq. *The Lawn,* 105, *Tulse-hill, S.E.*
1862		Finnis, Thomas Quested, Esq., Alderman. *Wanstead, Essex, N.E.*
1874		Firth, Fras. Helme, Esq. 25, *Cockspur-street, S.W.*
1870	930	*Firth, John, Esq., J.P. *Care of Messrs. R. Buckland and Son, Hop-gardens, St. Martin's-lane, W.C.*
1863		Fisher, John, Esq. 15, *Beaufort-gardens, S.W.*
1869		Fitch, Frederick, Esq., F.R.M.S. *Hadleigh-house, Highbury-new-park, N.*
1857		*Fitzclarence, Commander the Hon. George, R.N. 1, *Warwick-square, S.W.*
1872		Fitzgerald, A., Esq. *Verulam Club.*
1861		Fitzgerald, Captain Keane. 2, *Portland-place, W.*
1873		Fitz-Gerald, R. U. Penrose, Esq. 110, *Eaton-square, S.W.*
1873		Fitz-James, Frank, Esq., C.E. 35, *Kensington-gardens-square, W.*
1874		*Fitz Roy, Capt. Rob. O'Brien, R.N. *United Service Club, Pall-mall.*
1857		Fitzwilliam, The Hon. C. W., M.P. *Brookes's Club, St. James's-street, S.W.*
1837	940	*Fitzwilliam, William Thomas, Earl. 4, *Grosvenor-square, W.; and Wentworth-house, Rotherham, Yorkshire.*
1865		*Fitzwilliam, William S., Esq. 28, *Ovington-square, Brompton, S.W.*
1863		Fleming, G., Esq. *Brompton Barracks, Chatham.*
1861		*Fleming, John, Esq., C.S.I. *Hill-hall, Epping.*
1865		Fleming, Rev. T. S. *The Vicarage, St. Clement's, Leeds.*
1853		*Flemyng, Rev. Francis P. *Prospect-hill, Dunoon, Scotland.*
1857		Fletcher, Thomas Keddey, Esq. *Union-dock, Limehouse, E.*
1873		Foggo, Geo., Esq. 25, *Cockspur-street, S.W.*
1863		Foley, Major-Gen. the Hon. St. George, C.B. 24, *Bolton-street, W.*
1874		Folkard, A., Esq. *Thatched House Club, St. James's-street, S.W.*
1861	950	Foord, John Bromley, Esq. 52, *Old Broad-street, E.C.*
1874		Forbes, A. Litton A., Esq. *Clarence Club,* 1, *Regent-street, W.*
1860		Forbes, Commander Charles S., R.N. *Army and Navy Club, S.W. Care of Messrs. Woodhead.*
1863		Forbes, Capt. C. J. F. Smith.
1867		Forbes, Geo. Edward, Esq. *Colinton, Ipswich, Queensland; Union Club, S.W.;* 11, *Melville-street, Edinburgh; New Club, Edinburgh.*
1872		Forbes, Henry, Esq. 16, *Bolton-gardens, South Kensington, W.*
1872		Forbes, James G. T., Esq., Staff-Surgeon R.N. *Royal Hospital, Greenwich.*
1873		Forbes, General Jno., C.B. *Inverernan, Strathdon, Aberdeenshire; and Forbes and Co.,* 12, *Leadenhall-street, E.C.*
1874		Forbes, Major Jno. G., R.E. 2, *The Terrace, Kensington-gardens-square, W.; and* 14, *St. James's-square, S.W.*
1860		Forbes, Lord, M.A. *Castle Forbes, Aberdeenshire.*
1873	960	Forbes, W. F., Esq. *Loch-cote-house, Bathgate, N.B.; and Castleton.*
1869		Ford, Col. Barnett (Governor of the Andaman Islands). 31, *Queensborough-terrace, Hyde-park, W*

Year of Election.

1874 Forde, Henry Charles, Esq., C.E. *Ridgway-place, Wimbledon.*

1874 *Forlong, Lieut.-Colonel J. G. R., Madras Staff Corps. *Care of Messrs. Grindlay and Co., 55, Parliament-street, S.W.*

1872 *Forrest, Alex., Esq., Survey Department of Perth. *Western Australia. Care of Messrs. Baker and Oliphant, 37, Walbrook, E.C.*

1872 *Forrest, Jno., Esq. *Care of James McDonald and Co., 17, Finsbury-circus, E.C.*

1874 Forssman, Comr. O. A. (Consul for Portugal). *Potschefstroom, Transvall Republic, S. Africa. Care of Vicomte Duprat, 8, St. Mary Axe, E.C.*

1868 Forster, Hon. Anthony. *Finlay-house, Brittany-road, St. Leonards-on-Sea.*

1839 *Forster, Right Hon. William Edward, M.P. 80, *Eccleston-square, S.W.; and Burley, near Otley.*

1867 Forsyth, Sir T. Douglas, K.C.S.I., C.B., Commissioner, Jullundhur, Punjaub. *Care of Messrs. Sinclair, Hamilton, and Co., 17, St. Helen's-place, E.C.*

1861 970 Forsyth, William, Esq., M.P., Q.C. 61, *Rutland-gate, S.W.*

1861 *Fortescue, Hon. Dudley F. 9, *Hertford-street, Mayfair, W.*

1873 Foss, Edward William, Esq. *Trensham-house, Croydon.*

1873 Foss, G. Lush, Esq. *Clevedon-house, Coronation-road, Bristol.*

1869 Foster, Ebenezer, Esq., 19, *St. James's-place, St. James's, S.W.*

1866 Foster, Edmond, jun., Esq. 79, *Portsdown-road, Maida-vale, W.*

1864 Foster, H. J., Esq.

1871 Foster, James Murray, Esq., L.M.D., F.R.C.P., F.S.A., &c. *Nazeerah, Assam, Bengal. Care of Joseph Foster, Esq., Collumpton, Devon.*

1873 Fowler, A. Grant, Esq. 3, *St. German's-place, Blackheath.*

1863 *Fowler, J. T., Esq. *Government Inspector of Schools, Adyar, Madras, India. Care of Rev. A. Wilson, National Society's Office, Sanctuary, Westminster.*

1872 980*Fowler, John, Esq., C.E. *Thornwood-lodge, Campden-hill, W.*

1850 *Fowler, Robert N., Esq. M.A. 50, *Cornhill, E.C.; and Tottenham, N.*

1859 Fox, Lieut.-Colonel A. Lane. *Guildford, Surrey.*

1866 Fox, D. M., Esq., Chief Eng. Santos and St. Paulo Railway. *St. Paulo, Brazil.*

1864 *Fox, Francis E., Esq., B.A. *Falmouth.*

1865 Fox, Samuel Crane, Esq. 31, *Cambridge-gardens, Notting-hill, W.*

1865 *Franks, Aug. W., Esq. 103, *Victoria-street, S.W.*

1860 Franks, Charles W., Esq. 2, *Victoria-street, S.W.*

1862 Fraser, Captain H. A., I.N. *Zanzibar. Care of Messrs. Grindlay, 55, Parliament-street, S.W.*

1874 Fraser, Jas. Grant, Esq., C.E. 9, *Great Queen-street, Westminster, S.W.*

1866 *990 Fraser, Captain T. *Care of Col. Macdonald, Senior United Service Club, S.W.*

1868 Frater, Alex., Esq. *Canton. Care of James Frater, Esq., Town-house, Aberdeen.*

1873 Freeland, H. W., Esq. *Chichester; and Athenæum Club, Pall-mall.*

B Freeman, Henry W., Esq.

1869 Freke, Thomas George, Esq. 1, *Cromwell-houses, Kensington, W.*

1863 Fremantle, Captain Hon. Edmund Robert, R.N., C.B., C.M.G. 20, *Eaton-place, S.W.*

1864 Freme, Major James H. *Wrentnall-house, Shropshire; and Army and Navy Club, S.W.*

Year of Election.

1872 French, Colonel P. F. 8, *Duke-street, St. James's, S.W.*

1850 Frere, Bartle John Laurie, Esq. 45, *Bedford-square, W.C.*

1839 *Frere, George, Esq. 16, *Great College-street, S.W.*

1867 1000 Frere, Right Hon. Sir Hy. Bartle Edw., P.C., K.C.B., G.C.S.I., D.C.L. *Wressil-lodge, Wimbledon, Surrey.*

1842 *Frere, William Edw., Esq., F.R.A.S. *The Rectory, Bitton, Gloucestershire.*

1869 *Freshfield, Douglas W., Esq. 6, *Stanhope-gardens, South Kensington, W.; and United University Club, S.W.*

1873 *Freshfield, W. Dawes, Esq. 64, *Westbourne-terrace, W.*

1872 Friedrichsen, Aug. Daniel, Esq.

1874 Frith, Rev. William. 3, *Brunswick-villas, Cambridge-road, Turnham-green, W.*

1863 Fuidge, William, Esq. 5, *Park-row, Bristol.*

1865 Fuller, Thomas, Esq. 119, *Gloucester-terrace, Hyde-park, W.; United University Club, S.W.*

1860 Fussell, Rev. J. G. Curry. 16, *Cadogan-place, S.W.; and Kiloskehane-castle, Templemore, Ireland.*

1868 Fyfe, Andrew, Esq., M.D. 112, *Brompton-road, S.W.*

1866 1010 Fytche, Major-Gen. Albert, C.S.I. 21, *Lowndes-sq., S.W.; and Reform Club, S.W.*

1863 *Gabrielli, Antoine, Esq. 6, *Queen's-gate-terrace, Kensington, W.*

1858 Gaisford, Thomas, Esq. *Travellers' Club, S.W.*

1872 Gale, Henry, Esq., C.E. *Care of Mr. A. S. Twyford, 5, Southampton-street, Bloomsbury, W.C.*

1855 *Galloway, John James, Esq.

1869 Galsworthy, Frederick Thomas, Esq. 8, *Queen's-gate, Hyde-park, W.*

1873 Galsworthy, Robt. Herbert, Esq. 61, *Gloucester-place, Portman-square, W.*

1848 *Galton, Captain Douglas, R.E. 12, *Chester-street, Grosvenor-place, S.W.*

1850 *Galton, Francis, Esq., M.A., F.R.S. 42, *Rutland-gate, S.W.; and 5, Bertie-terrace, Leamington.*

1871 Galton, Theodore Howard, Esq. 78, *Queen's-gate; and Hadzor-ho., Droitwich.*

1854 1020 *Gammell, Major Andrew. *Drumtochty, Kincardineshire, N.B.*

1873 *Gardiner, H. J., Esq. 6, *Orsett-terrace, Westbourne-terrace, W.*

1869 Gardner, Christopher T., Esq. *British Consulate, Canton.*

1865 Gardner, Captain G. H., R.N. 7, *James-street, Westbourne-terrace, W.*

1866 Gardner, John Dunn, Esq. 19, *Park-street, Park-lane, W.*

1863 Gascoigne, Frederic, Esq.

1859 *Gassiot, John P., jun., Esq. *The Culvers, Carshalton, Surrey.*

1866 Gastrell, Lieut.-Col. James E. (B. Staff Corps). *Surveyor-General's Office, Calcutta. Care of H. T. Gastrell, Esq., 36, Lincoln's-inn-fields, W.C.*

1866 *Gatty, Charles H., Esq., M.A. *Felbridge-park, East Grinstead, Sussex.*

1873 Gawler, Colonel J. C. *Tower of London, E.C.*

1873 1030 *Geiger, Jno. Lewis, Esq. 8, *Duke-street, St. James's, S.W.*

Year of Election.

1870 *Gellatly, Edward, Esq. *Uplands, Sydenham.*

1865 George, Rev. H. B. *New College, Oxford.*

1859 Gerstenberg, Isidore, Esq. 9, *Gloucester-terrace, Gloucester-gate, Regent's-park, N.W.*

1866 *Gibb, George Henderson, Esq. 13, *Victoria-street, Westminster, S.W.*

1865 *Gibbons, Alderman Sir Sills John, Bart. *Iridge-place, Hurst-green, Sussex.*

1859 *Gibbs, H. Hucks, Esq. *St. Dunstan's, Regent's-park, N.W.*

1873 Gibbs, James, Esq.

1873 Gibbs, Jno. Dixon, Esq. *The Willows, Englefield-green, N.*

1870 Gibson, James Y., Esq. *Care of Messrs. Williams and Norgate, Henrietta-street, Covent-Garden, W.C.*

1874 1040 Gill, Lieutenant W. J., R.E. 1, *Edinburgh Mansions, Victoria-street; and Junior United Service Club, Charles-street, S.W.*

1855 Gillespie, Alexander, Esq. *Heathfield, Walton-on-Thames, Surrey.*

1866 *Gillespie, William, Esq. (*of Torbane-hill*). 46, *Melville-street, Edinburgh.*

1868 *Gillett, Alfred, Esq. 27, *Chesham-place, S.W.*

1863 *Gillett, William, Esq. 6, *William-street, Lowndes-square, S.W.*

1861 Gilliat, Alfred, Esq. *Court-lodge, West Farleigh, Maidstone.*

1868 Gilliat, Algernon, Esq. 76, *Westbourne-terrace, Hyde-park, W.*

1863 Gillies, Robert, Esq., C.E. *Care of Messrs. Reith and Wilkie, Dunedin, Otago, N.Z. Per Messrs. Sampson Low and Co.,* 188, *Fleet-street, E.C.*

1874 *Gilman, Ellis, Esq. 53, *Sussex-gardens, Hyde-park, W.*

1864 Gladstone, George, Esq. 35, *Ventnor-villas, Cliftonville, Brighton.*

1863 1050 Gladstone, J. H., Esq., PH.DR. 17, *Pembridge-square, W.*

1862 *Gladstone, Robert Stuart, Esq.

1864 *Gladstone, W. K., Esq. *Fitzroy-park, Highgate, N.*

1873 Glanville, Silvanus Goring, Esq. 52, *Threadneedle-street, E.C.*

1872 Glass, James George Henry, Esq. 28, *London-street, Edinburgh. Care of Messrs. King and Co.,* 45, *Pall-mall, S.W.*

1867 Glass, H. A., Esq. *St. Kilda, Vanbrugh-park, Blackheath, S.E.*

1854 Glen, Joseph, Esq., Mem. Geogr. Soc. of Bombay. *Oriental Club, W.*

1857 Glover, Capt. Sir John H., R.N., K.C.M.G., 27, *Bury-street, St. James's, S.W.*

1866 Glover, Robert Reaveley, Esq. 30, *Great St. Helen's, E.C.*

1870 Glover, Colonel T. G., R.E. *Barwood, Hersham, near Esher, Surrey.*

1864 1060 Glyn, Sir Richard George, Bart. *Army and Navy Club, S.W.*

1874 *Godman, F. Du Cane, Esq. 6, *Tenterden-street, W.; and Child Okeford-house, Blandford.*

1869 Goldney, G. Esq., M.P. 40, *Hill-street, Berkeley-square, W.*

1874 Goldsmid, Bartle, Esq. 32, *Nottingham-place, Marylebone, W.*

1868 Goldsmid, Sir Francis, Bart., M.P. *Inner-circle, Regent's-park, N.W.*

1863 Goldsmid, Maj.-Gen. Sir Frederic John, K.C.S.I., C.B. 1, *Southwell-gardens, South Kensington; and United Service Club, S.W.*

1861 Goldsmid, Julian, Esq. 105, *Piccadilly, W.*

Year of Election.	
1873	Goldsworthy, R. Tuckfield, Esq. *St. Stephen's Club, Westminster, S.W.*
1860	Gooch, Thomas Longridge, Esq. *Team-lodge, Saltwell, Gateshead-on-Tyne.*
1864	Goodall, George, Esq. *Messrs. Cox and Co., Craig's-court; and Junior Carlton Club, W.*
1863	1070 *Goodenough, Captain J. G., R.N. *United Service Club, S.W.*
1864	*Goodenough, Lieut.-Col. W. H., R.A. *Woolwich, S.E.; and Care of Messrs. Cox and Co., Craig's-court, S.W.*
1875	Goodinge, Jas. W., Esq. 18, *Aldersgate-street, E.C.*
1874	Goodliffe, Fras. Gimber, Esq. *Care of Goodliffe and Smart*, 95, *Bishopsgate-street-within, E.C.*
1871	*Goodwin, William, Esq. *Claughton-park, near Birkenhead.*
1865	*Goolden, Charles, Esq. *United University Club, S.W.*
1861	Gooldin, Joseph, Esq. 18, *Lancaster-gate, W.*
1856	*Gordon, Major-General the Hon. Sir Alexander H., K.C.B. 50, *Queen's-gate-gardens, South Kensington, W.*
1874	Gordon, Arthur Leo, Esq. *Wardhouse, Aberdeenshire; and* 42, *Duke-street, St. James's, S.W.*
1873	Gordon, J. Newall, Esq. H.B.M.'s Vice-Consul, Brazil. *Morro Velho, Minas Geraes, Brazil.*
1874	1080 Gordon, Robt., Esq., C.E. 5, *Albert-street, Victoria-square, S.W.*
1870	Gordon, Russell Manners, Esq. 38, *Alpha-road, St. John's-wood, N.W.*
1866	Gore, Colonel Augustus F. *St. Vincent.*
1853	Gore, Richard Thomas, Esq. 6, *Queen-square, Bath.*
1874	Gore, Lieut. St. George C., R.E. *Care of Messrs. Cox and Co., Craig's-court, S.W.*
1859	Gosling, Fred. Solly, Esq. 23, *Spring-gardens, S.W.*
1862	Goss, Samuel Day, Esq., M.D. 111, *Kennington-park-road, S.*
1870	Gottlieb, Felix Henry, Esq., J.P. *Singapore, East Indies.*
1868	Gough, Hugh, Viscount, F.L.S. *Lough Cutra Castle, Gort, Co. Galway.*
1835	Gould, Lieut.-Colonel Francis A. *Buntingford, Herts.*
1873	1090 Gould, Rev. Jas. Aubrey. *L* 4, *Albany, W.*
1846	Gould, John, Esq., F.R.S., F.L.S. 26, *Charlotte-street, Bedford-square, W.C.*
1870	Gould, Rev. Robert John. *Stratfield Mortimer, near Reading.*
1872	Gourley, Colonel E., M.P. *Sunderland.*
1867	Grabham, Michael, Esq., M.D. *Madeira. Care of C. R. Blandy, Esq.*, 25, *Crutched-friars, E.C.*
1868	Graeme, H. M. S., Esq.
1869	Graham, Andrew, Esq., Staff Surg. R.N. *Army and Navy Club, S.W.*
1858	Graham, Cyril C., Esq. 9, *Cleveland-row, St. James's, S.W.; and Debroe-house, Watford, Herts.*
1874	Graham, James Henry Stuart, Esq. 1 *Belgrave-road, Shepherd's-bush, W.*
1871	Graham, J. C. W. Paul, Esq. 1, *Carlisle-place, Victoria-street, S.W.; and Brooks's Club, St. James's-street, S.W.*

Year of Election.	
1868	1100 *Graham, Thomas Cuninghame, Esq. *Carlton Club, S.W.; and Dunlop-house, Ayrshire.*
1870	*Grant, Andrew, Esq. *Oriental Club, Hanover-square, W.*
1863	*Grant, C. Mitchell, Esq. 15, *George-street, Hanover-square.*
1861	Grant, Daniel, Esq.
1865	*Grant, Francis W., Esq. 40, *Pall-mall, S.W.*
1860	Grant, Lieut.-Col. James A., C.B., C.S.I., F.R.S. *E. India U.S. Club, S.W.; and 7, Park-square, Regent's-park, N.W.; and Ivy-bank, Nairn, N.B.*
1862	Grant, Lieutenant J. Murray (Inspector Cape Frontier Police), Cape of Good Hope. *Care of Messrs. Ridgway, Waterloo-place, S.W.*
1873	Grant, Colonel W. Francis. *L 6, Albany, W.*
1874	Grantham, Geo., Esq. *Barcombe-place, near Lewes.*
1872	Gray, Andrew, Esq. 1, *Lime-street-square, E.C.*
1870	1110 Gray, Charles W., Esq. 14, *Chester-terrace, Regent's-park, N.W.*
1871	Gray, Mathew, Esq. *St. John's-park, Blackheath, S.E.*
1875	*Gray, Matthew Hamilton, Esq. *St. John's-park, Blackheath.*
1873	Gray, Robert Kaye, Esq. *St. John's-park, Blackheath.*
1868	Gray, Lieut.-Colonel William. *Farley-hall, Reading.*
1862	Greathed, Lieut.-Colonel Wilberforce, W. H., C.B. 7, *Queen-street, Mayfair, W.*
1863	Greaves, Rev. Richard W. 1, *Whitehall-gardens, S.W.*
1861	Green, Captain Francis, 58th Regiment.
1871	Green, John Henry, Esq. 8, *Weighton-road, South Penge-park, S.E.*
1871	Green, Joseph E., Esq. 12A, *Myddelton-square, E.C.*
1868	1120 Green, Rev. W., M.A. *Chaplain to the Tower of London.*
1869	Green, Major-General Sir W. H. R., K.C.S.I., C.B. 36, *St. George's-road, Eccleston-square, S.W.*
1871	Greene, Captain John Clinton, R.A.
1874	Greenfield, Thomas Challen, Esq. 84, *Basinghall-street, E.C.; and 6, Outram-villas, Addiscombe.*
1857	*Greenfield, W. B., Esq. 59, *Porchester-terrace, Hyde-park, W.; and Union Club, S.W.*
1870	Greenup, W. Thomas, Esq. 22, *Havelock-square, Sheffield.*
1871	Greg, Thomas, Esq. 8, *Eaton-square, S.W.*
1865	Greg, W. R., Esq., Comptroller of H.M. Stationery Office. *Wimbledon, S.W.*
1858	*Gregory, Sir Augustus Charles. *Surveyor-General, Brisbane, Queensland, Australia.*
1858	Gregory, Charles Hutton, Esq., C.E. 1, *Delahay-street, Westminster, S.W.*
1860	1130 *Gregory, Francis Thomas, Esq. *Queensland.*
1858	*Gregory, Isaac, Esq. *Merchants'-college, Blackpool.*
1872	Gregson, George, Esq. 26, *Harley-street, Cavendish-square, W.*
1857	Grellet, Henry Robert, Esq. *Care of L. Mentzendorff, Esq., 87, Great Tower-street, E.C.*
1865	*Grenfell, Henry R., Esq., M.P. 15, *St. James's-place, S.W.*
1830	*Greswell, Rev. Richard, M.A., F.R.S. 39, *St. Giles's-street, Oxford.*

Year of Election.		
1866		Grey, Charles, Esq. 13, *Carlton-house-terrace, S.W.*
1837		*Grey, Sir George, K.C.B.
1875		Grey, Adm. Hon. Sir F. W., G.C.B. *Linwood, Sunningdale, Staines.*
1873		Grey, Captain H. (Bengal Staff Corps). 4, *Foulis-terrace, W.*
1864	1140	Grierson, Charles, Esq.
1874		Griesbach, C. L., Esq. 64, *Elgin-crescent, W.*
1868		Griffin, Daniel, Esq. 18, *Leadenhall-street, E.C.*
1861		*Griffith, Daniel Clewin, Esq. 20, *Gower-street, W.C.*
1839		Griffith, John, Esq. 16, *Finsbury-place-south, E.C.*
1863		Griffith, Sir Richard. *Hendersyde-park, Kelso, N.B.*
1836		Griffith, Richard Clewin, Esq. *20, *Gower-street, W.C.*
1872		Griffiths, Arthur Edward, Esq. 25, *Talbot-square, Hyde-park, W.*
1867		Griffiths, Captain A. G. F., 63rd Reg. (Major of Brigade, Gibraltar).
1869		Griffiths, William, Esq., J.P. 24, *Great Cumberland-place, W.; and The Welkin, Lindfield, Sussex.*
1855	1150	Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. *Townsend-house, Malvern.*
1872		Grinlinton, J. J., Esq. *Colombo, Ceylon. Care of Edward Woods, Esq.*, C.E., 3, *Great George-street, S.W.*
1861		Grosvenor, Lord Richard, M.P. 33, *Upper Grosvenor-street, W.*
1857		Gruneisen, Charles Lewis, Esq. 16, *Surrey-street, Strand, W.C.*
1861		Gunnell, Captain Edmund H., R.N. *Army and Navy Club, S.W.; and* 21, *Argyll-road, Campden-hill, W.*
1859		*Gurney, John H., Esq. *North Repps, Norwich.*
1857		Gurney, Samuel, Esq. 20, *Hanover-terrace, Regent's-park, N.W.*
1874		Gwynne, Fras. A., Esq. *Royal Thames Yacht Club, Albemarle-street, W.*
1872		*Gwynne, James Eglinton W., Esq., C.E., F.S.A., J.P., &c. 97, *Harley-street, W.; and Cliff-house, Dovercourt, Essex.*
1865		Gwyther, John H., Esq. *Ellerslie, Park-hill-road, Addiscombe.*
1870	1160	Habicht, Claudius Edward, Esq. 38, *Eaton-square, S.W.*
1863		Hadfield, William, Esq. 11, *Inverness-road, W.*
1865		Hadley, Henry, Esq., M.D. *Needwood-lodge, Bay's-hill, Cheltenham.*
1874		Hadow, J. W., Esq. 13, *Bruton-street, Berkeley-square, W.; and* 14, *St. James's-square, S.W.*
1863		Hadow, P. D., Esq. *Sudbury-priory, Middlesex.*
1874		Hairly, Edward, Esq. 22, *Victoria-villas, King Edward's-road, S. Hackney.*
1868		Hale, Rev. Edward, M.A. *Eton College; and United University Club, S.W.*
1860		Haliday, Major-General William Robert. *United Service Club, S.W.*
1853		Halifax, Viscount, G.C.B. 10, *Belgrave-sq., S.W.; and Hickleton, Yorkshire.*
1853		*Halkett, Rev. Dunbar S. *Little Bookham, Surrey.*
1853	1170	*Halkett, Commander Peter A., R.N.
1874		Hall, Alex. Lyons, Esq. 48, *Blenheim-crescent, Notting-hill, W.*

Year of Election.	
1861	Hall, Charles Hall, Esq. *Watergate-house, Emsworth.*
1863	Hall, Henry, Esq. 109, *Victoria-street, S.W.*
1869	*Hall, James MacAlester, Esq.
1862	Hall, James Tebbutt, Esq. *Fore-street, Limehouse, E.*
1871	Hall, Admiral Robert, C.B. 38 *Craven-hill-gardens, W.; and Admiralty, S.W.*
1863	Hall, Thomas F., Esq., F.C.S. 29, *Warwick-square, S.W.*
1853	Hall, Admiral Sir William Hutcheson, K.C.B., F.R.S. *United Service Club, S.W.; and* 48, *Phillimore-gardens, Kensington, W.*
1858	Halloran, Arthur B., Esq. 3, *Albert-terrace, St. Leonard's, Exeter.*
1872	1180 *Halpin, Capt. R. C. 38, *Old Broad-street, E.C.*
1871	*Hamilton, Andrew, Esq., Lieut. 102nd Regiment. *The House of Falkland, Fyfe; and Naval and Military Club, W.*
1862	Hamilton, Archibald, Esq. *South Barrow, Bromley, Kent, S.E.*
1861	Hamilton, Lord Claude, 19, *Eaton-square, S.W.; and Barons-court, County Tyrone.*
1830	*Hamilton, Captain Henry G., R.N. 71, *Eccleston-square, S.W.*
1869	Hamilton, Captain Richard Vesey, R.N. *Pembroke Dockyard, South Wales.*
1861	Hamilton, Col. Robert William, Grenadier Guards. 103, *Eaton-square S.W.*
1863	Hamilton, Rowland, Esq. *Oriental Club, W.*
1830	Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.*
1872	Hamilton, Walter, Esq. 13, *Mitre-court-chambers, Temple, E.C.*
1846	1190 Hamilton, Rear-Admiral W. A. Baillie. *Macartney-house, Blackheath, S.E.*
1853	Hampton, Lord, F.R.S. 41, *Eaton-square, S.W.; and Westwood-park, Droitwich, Worcestershire.*
1874	Hanbury, R. W., Esq., M.P. *East Close, near Christchurch, Hants.*
1853	*Hand, Admiral George S., C.B. *U. S. Club, S.W.; and H.M.S. 'Victory.'*
1860	*Handley, Benjamin, Esq. *Lima, Peru; and* 74, *Market-place, Sheffield.*
1874	Handley, Captain Francis (late I.N.). *The Limes, Gipsy-hill, Upper Norwood.*
1866	Hanham, Commr. T. B., R.N. *Manston-house, near Blandford, Dorset.*
1861	*Hankey, Blake Alexander, Esq.
1874	Hankey, Reginald, Esq. 71, *Chester-square, S.W.; and Arthur's Club, S.W.*
1870	*Hankey, Rodolph Alexander, Esq. 54, *Warwick-square, S.W.*
1857	1200 Hankey, Thomson, Esq. 45, *Portland-place, W.*
1837	*Hanmer, Lord, F.R.S. 59, *Eaton-place, S.W.; and Hanmer-hall and Bettisfield-park, Flintshire.*
1874	*Hanmer, Philip, Esq., B.A. *Christchurch, New Zealand.*
1874	Harberton, Viscount. 60, *Rutland-gate, S.W.*
1859	*Hansard, Henry, Esq. 13, *Great Queen-street, W.C.*
1870	Harbord, John B., Esq., M.A., Chaplain R.N. 69, *Victoria-park-road, E.*
1840	*Harcourt, Egerton V., Esq. *Whitwell-hall, York.*
1864	*Hardie, Gavin, Esq. 113, *Piccadilly, W.*
1864	Harding, Major Charles. *Grafton Club,* 10, *Grafton-street, Piccadilly, W.*
1864	Harding, J. J., Esq. 1, *Barnsbury-park, Islington, N.*
1864	1210 Hardinge, Capt. E., R.N. 32, *Hyde-park-square, W.*

Year of Election.

1861 Hardinge, Henry, Esq., M.D. 18, *Grafton-street, Bond-street, W.*

1871 *Hargrave, Joseph, Esq. *Fort Garry, Winnipeg, Manitoba, Canada. Care of the Hudson Bay Company, 1, Lime-street, E.C.*

1874 Hargreaves, William, Esq. *Dartmouth-grove, Blackheath, S.E.*

1873 Harley, Colonel R. W., C.B., C.M.G. *Junior United Service Club, Chandos-st., W.*

1868 Harper, J. A. W., Esq. 23, *Grosvenor-road, Pimlico, S.W.; and Lloyd's, E.C.*

1873 Harper, W. H., Esq. *New Shoreham, near Brighton.*

1853 Harris, Admiral the Hon. Sir E. A. J., K.C.B. *H.B.M.'s Envoy Extraordinary and Minister Plenipotentiary, The Hague, Holland. Messrs. Woodhead.*

1869 Harris, Capt. G. F., 20th Regt.

1859 Harris, Capt. Henry, H.C.S. 35, *Gloucester-terrace, Hyde-park, W.*

1871 1220 Harris, Edwd., Esq. *Rydal-villa, Longton-grove, Upper Sydenham.*

1865 Harris, John M., Esq. *Yelbana, Anerley-road, S.*

1874 Harris, Reader, Esq. *Temple Club, Arundel-street, Strand, W.C.*

1863 Harrison, Charles, Esq. 3, *Great Tower-street, E.C.*

1870 Harrison, Charles, Esq. 10, *Lancaster-gate, W.*

1865 *Harrison, William, Esq., F.S.A., F.G.S., &c. *Conservative Club, S.W.; Royal Thames Yacht Club, 7, Albemarle-street, W.; and Samlesbury-hall, near Preston, Lancashire.*

1838 Harrowby, Dudley, Earl of, F.R.S. *Sandon-house, Lichfield; and Norton, Gloucestershire.*

1872 Harston, Edward F. B., Esq. 14, *Mecklenburgh-square, W.C.*

1872 Hart, Frederick Ralph, Esq., F.R.S.A., Membre de la Société de Géographie de Paris, &c.: Mem. Pure Literature Soc., London. *Government-house, Trinidad, British West Indies; and* 32, *Westbourne-park-road, W.*

1873 Hart, Henry Neville, Esq. 107, *Harley-street, W.*

1868 1230 *Hart, J. L., Esq. 20, *Pembridge-square, W.*

1875 Hart, James, Esq. *Winslow-house, South Norwood.*

1854 *Hartland, F. Dixon-, Esq., F.S.A., &c. 14, *Chesham-place, S.W.; and the Oaklands, near Cheltenham.*

1874 Hartley, Sir Chas. Aug., F.R.S.E., &c. *Reform Club, Pall-mall, S.W.*

1874 Hartnell, Rev. Bedford, M.A. *Clifton College, Bristol.*

1875 Harvey, Alex. S., Esq. 228, *Union-street, Aberdeen.*

1875 Harvey, Aug. Jno., Esq. 1, *South-bank, Regent's-park, N.W.*

1863 Harvey, Charles, Esq. *Rathgar-cottage, Streatham, S.*

1867 Harvey, James, Esq. (Solicitor). *Esk-street, Invercargill, Southland, New Zealand. Care of the Bank of Otago, Old Broad-street, E.C.*

1864 Harvey, John, Esq. *Ickwell Bury, Biggleswade.*

1864 1240 Harvey, John, Esq. 7, *Mincing-lane, E.C.*

1869 Harvey, John, Esq., LL.D. *Château Deslyons, Boulogne-sur-Mer.*

1866 Harvey, Richard M., Esq. 13, *Devonshire-street, Portland-place, W.*

1871 Harvie, Edgar Christmas, Esq. *City of London Club, Old Broad-street.*

1873 Harwood, S., Esq. *Hamilton-house, Leamington.*

1873 Hatherton, Lord. *Teddesley-park, Penkridge, Staffordshire.*

Year of Election.

1875 Havilland, Rev. C. R. de. 52, *Limes-grove, Lewisham; and* 11, *Serjeant's-inn, Fleet-street, E.C.*

1873 Hawker, Geo. C., Esq. *Care of Messrs. Hayard and Caldecott,* 1, *New Basing-hall-street, E.C.*

1858 Hawker, Edward J., Esq. 37, *Cadogan-place, S.W.*

1834 Hawkins, Francis Bisset, Esq., M.D., F.R.S. 146, *Upper Harley-street, W.; and Leweil-lodge, Dorchester.*

1840 1250 *Hawkins, John, Esq.

1858 *Hawkins, Major-General J. Summerfield, R.E. *St. Leonards, St. James's-road, Malvern.*

1873 Hawkins, Rev. W. Bentinck L., F.R.S. 33, *Bryanston-square, W.*

1861 Hawksley, Thomas, Esq., C.E. 14, *Phillimore-gardens, Kensington, S.W.*

1871 Hay, Andrew, Esq. *Oriental Club, Hanover-square, S.W.; and Bombay.*

1852 *Hay, Rear-Admiral Sir J. C. Dalrymple, Bart., M.P., F.R.S. 108, *St. George's-square, S.W.; U. S. Club, S.W.; Dunragit, Glenluce; and Harrow-on-the-hill, N.W.*

1863 *Hay, Rear-Admiral Lord John, M.P., C.B. 15, *Cromwell-road, South Kensington, W.*

1872 Hay, Jno. Ogilvy, Esq. (Hon. Magist. and J. P. Brit. Burmah). *Rangoon; and care of Messrs. Hay, Ingram and Co,* 79, *Great Tower-street, E.C.*

1865 Hay, Lord William. *B* 5, *Albany, W.*

1872 Haydon, G. H., Esq. *Bethlehem Hospital, S.E.*

1874 1260 Hayes, A. A., Esq., jun. *Care of Horace Farquhar, Esq.,* 9, *King William-street, E.C.*

1870 Haynes, Stanley L., Esq., M.D. *Malvern-link, Worcestershire.*

1864 Haysman, James, Esq. *Burgess-hill, Finchley-road, N.W.*

1862 Head, Alfred, Esq. 13, *Craven-hill-gardens, Bayswater, W.*

1871 Head, Henry, Esq. *Stoke Newington, N.*

1871 Head, Geo. T., Esq. *East-cliff-house Grammar-school, Margate.*

1863 Headlam, Right Hon. Thomas E., M.P. 27, *Ashley-place, Victoria-street, S.W.*

1874 Heard, Dr. Samuel S. *Derriguni-castle, Kenmare, Ireland; and* 14, *St. James's-square, S.W.*

1856 Heath, The Baron, F.R.S., F.S.A. 31, *Old Jewry, E.C.*

1874 Heathcote, Com. Jas. Arnold. *The Red-house, Upton, Bexley, Kent.*

1863 1270 Heathfield, W. E., Esq. 30, *King-street, St. James's.*

1861 *Hector, Alexander, Esq.

1861 Hector, James, Esq., F.R.S., M.D. *Care of E. Stanford, Esq.*

1873 Heeley, W. E., Esq. *Urban-lodge, Wimbledon-park-road, Wandsworth.*

1871 Heinemann, N., Esq., PH.D. *Scientific Club,* 7, *Savile-row, W.*

1872 *Helme, Richard, Esq. *Walthamstow, Essex.*

1862 Hemans, Geo. Willoughby, Esq., C.E. *Westminster-chambers, Victoria-street, S.W.*

1870 *Henderson, David Mitchell, Esq. 1, *Carden-place, Aberdeen; and Old Calabar, W. Africa.*

1871 *Henderson, G., Esq., M.D., F.L.S. *Care of Messrs. King and Co., Pall-mall, W.*

1874 Henderson, Henry, Esq. 14, *Balmoral-road, Elm-park, Liverpool.*

Year of Election.	
1853	1280 Henderson, John, Esq. 2, *Arlington-street, Piccadilly, W.*
1847	Henderson, Capt. K. G. *Care of Sir C. McGregor, Bart., and Co., 25, Charles-street, S.W.; and Naval and Military Club, Piccadilly, W.*
1866	Henderson, Patrick, Esq. *Care of George Reid, Esq., 21, Abchurch-lane, E.C.*
1844	*Heneage, Edward, Esq. *Stag's-end, Hemel Hempstead.*
1861	Henn, Rev. J., B.A., Head Master of the Manchester Commercial Schools. *St. John's Rectory, Manchester.*
1860	Hennessey, J. B. N., Esq. 1st *Asst. Trig. Survey of India, Dehra in the Dhoon, N.W. Provinces, India.* *Care of Messrs. H. S. King and Co.*
1838	*Henry, Wm. Chas., Esq., M.D., F.R.S. *Haffield, near Ledbury, Herefordshire.*
1861	*Henty, Douglas, Esq. *Chichester.*
1872	Herbert, Charles E., Esq. *Rawulpindee, Punjab. Care of Messrs. King and Co., 65, Cornhill, E.C.*
1857	Herd, Captain D. J. 2, *Norway-house, Limehouse, E.*
1858	1290 Hertslet, Edward, Esq., C.B. *Librarian, Foreign-office, S.W.; and Belle-vue-house, Richmond, S.W.*
1871	Hertslet, Geo. Thos., Esq. *Lord Chamberlain's-office, St. James's-palace, S.W.*
1861	Heugh, John, Esq. *Gaunts-house, Wimborne, Wells.*
1873	Hewitt, Richard, Esq. *The Green, Esher, Surrey, and 3, Princes'-square, Hyde-park, W.*
1840	*Heywood, James, Esq., F.R.S. *Athenæum Club, S.W.; and 26, Kensington-palace-gardens, W.*
1869	Heywood, Samuel, Esq. 171, *Stanhope-street, Hampstead-road, N.W.*
1860	Heyworth, Capt. Lawrence, 4th Royal Lancashire. *Junior United Service Club, S.W.*
1867	Higgins, Edmund Thomas, Esq., M.R.C.S. 10, *Harcourt-road, Anerley, S.E.*
1856	Hill, Arthur Bowdler, Esq. *South-road, Clapham-park, Surrey, S.*
1872	Hill, Clement L., Esq. *Foreign-office, S.W.*
1873	1300 Hill, Henry, Esq. 122, *Leadenhall-street, E.C.*
1874	Hill, Lieut. Jno., R.E. (Great Trig. Sur. of India). *Dehra Dhoon.*
1854	Hill, Lieut.-Colonel Stephen J., C.B., Governor of Antigua. *Army and Navy Club, S.W. Care of Capt. E. Barnett,* R.N., 14, *Woburn-square, W.*
1872	Hill, Samuel, Esq., M.D. 22, *Mecklenburgh-square, W.C.*
1874	Hills, Lieut.-Colonel James, C.B., V.C., R.A. *Care of Messrs. H. S. King & Co., Cornhill, E.C.*
1858	Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 64, *Lincoln's-inn-fields, W.C.*
1862	*Hinde, Samuel Henry, Esq. *Windham Club, S.W.*
1873	Hirst, William Henry, Esq. 103, *Mottram-road, Staleybridge, Cheshire.*
1873	Hirth, Dr. F. *Imperial Customs, China.*
1870	Hitchins, Capt. T. M., R.A., Adjutant, Hants Artillery Militia. *Gosport.*
1872	1310 *Hoare, Henry, Esq. (Banker). *Hoare's Bank, Fleet-street; and St. James's-square, S.W.*
1868	Hoare, Samuel, Esq. 7, *Hereford-gardens, Park-lane, S.W.*
1855	Hobbs, Wm. Geo. Ed., Esq. *Beulah-cottage, London-road, Enfield, N.*

Year of Election.	
1868	Hobson, Stephen James, Esq. 32, *Nicholas-lane, Lombard-street; and* 10, *Regent's-park-road, N.W.*
1874	*Hochschild, His Excellency, Baron (Swedish Minister). 2, *Great Cumberland-street, Hyde-park, W.*
1872	Hockin, Charles, Esq., M.A. 8, *Avenue-road, St. John's-wood, N.W.*
1875	Hodder, Edwin, Esq. 1, *Coleridge-road, Finsbury-park, N.*
1869	Hodges, Henry, Esq. *Brondesbury-lodge Collegiate-school, Kilburn.*
1856	*Hodgson, Arthur, Esq. *Clapton-house, near Stratford-on-Avon.*
1871	Hodgson, Henry Tylston, Esq. *Harpenden, St. Albans.*
1861	1320 *Hodgson, James Stewart, Esq. 24, *Princes-gardens, S.W.*
1857	Hodgson, Kirkman Daniel, Esq., M.P. 8, *Bishopsgate-street, E.C.*
1869	*Hodgson, William H., Esq. *Treasury-chambers; and* 1, *Whitehall-gardens, S.W.*
1868	Holdich, Lieut. Thos. Hungerford, R.E.
1839	*Holford, Robert S., Esq. *Dorchester-house, Park-lane, W.*
1867	Holland, Rev. Fred. Whitmore. *Evesham, Worcester.*
1861	Holland, Colonel James. *Southside, The Park, Upper Norwood, S.E.*
1863	Holland, Loton, Esq. *The Gables, Osborne-road, Windsor.*
1862	Holland, Robert, Esq. *Stanmore-hall, Great Stanmore, Middlesex.*
1873	Holland, Lieut. Swinton D., R.N. *Dumbleton, Evesham.*
1875	1330 *Hollebone, Fredk., Esq. *Ravensbourne-park, Catford-bridge.*
1871	*Hollingworth, Hy. Geo., Esq. *Kiu Kiang, China; and Bowdon, near Manchester.*
1861	Holme, J. Wilson, Esq., M.A. 83, *St. George's-square, S.W.*
1874	Holmwood, T. D., Esq., 7, *Church-terrace, Lee, Kent.*
1839	*Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Master's-office, Sydney, New South Wales. Care of Edgar Howell, Esq.,* 3, *St. Paul's-churchyard, E.C.*
1857	Holroyd, Henry, Esq., Barrister-at-Law. 2, *Elm-court, Temple, E.C.*
1867	Holstein, The Marquez de Souza. *Lisbon. Care of Messrs. Kraentler and Mieville,* 12, *Angel-court, E.C.*
1869	Holt, George, Esq. *Union-street, Willenhall.*
1871	Holt, Henry F. W., Esq. 6, *King's-road, Clapham-park; King and Co., Cornhill.*
1872	Holt, Lieut. Sydney A., R.N. *Care of Messrs. Hildreth and Ommanney,* 41, *Norfolk-street, Strand, W.C.*
1864	1340 Holt, Vesey, Esq. 17, *Whitehall-place, S.W.*
1873	Home, Lieut.-Colonel Robert, R.E. 25, *Kidbrook-road, Blackheath, S.E.*
1857	Homfray, William Henry, Esq. 6, *Storey's-gate, S.W.*
1864	*Hood, Sir Alex. Acland, Bart. *St. Andrie's-park, Bridgwater, Somerset.*
1873	*Hood, F. Jacomb, Esq. *Conservative Club, S.W.*
1862	Hood, Henry Schuback, Esq. *War-office, S.W.; and* 10, *Kensington-park-gardens, W.*
1866	*Hooker, J., Esq., C.B., M.D., F.R.S., F.L.S., &c. *Director of the Royal Gardens, Kew.*
1868	Hooper, Alf., Esq. *City of London Club, Old Broad-street, E.C.*
1870	Hooper, George Norgate, Esq. 139, *King Henry's-road, Adelaide-road, N.W.*

Year of Election.

1870 Hooper, Rev. Robert Poole. 31, Cambridge-street, Brighton.

1875 1350 Hooper, Wm. Edwd. Parry, Esq. 29, St. George's-road, Kilburn, N.W.; and 17, New-street, Spring-gardens, S.W.

1875 Hooper, W. F., Esq.

1861 Hopcraft, George, Esq. 3, Billiter-square, E.C.

1846 *Hope, Alex. James Beresford, Esq., M.P. Arklow-house, Connaught-place, Hyde-park, W.; and Bedgebury-park, Hurst-green, Kent.

1862 Hope, Capt. C. Webley, R.N. Messrs. Hallett & Co., St. Martin's-place, S.W.

1874 Hope, Percy, Esq. Mosely-buildings, Manchester.

1869 Hopkins, Capt. David, M.A.I. H.M. Consul at St. Paulo de Loando, West Coast of Africa.

1870 *Hopkins, Edward M., Esq. 3, Upper Berkeley-street, Portman-square, W.

1871 Hornby, Rev. James John, D.D. Head Master of Eton College.

1871 Horne, Francis, Esq.

1869 1360 Horrex, Theophilus, Esq. 18, Connaught-square, Hyde-park, W.

1868 Horton, James Africanus B., Esq., M.D., &c. Care of Messrs. McGrigor and Co., 25, Charles-street, S.W.

1870 Hoseason, Captain John C., R.N. United Service Club, S.W.

1861 Hoskins, Capt. A. H., R.N. Army and Navy Club, S.W. Care of Messrs. Woodhead.

1853 Houghton, Lord, D.C.L., F.R.S. Travellers' Club, S.W.; The Hall, Bawtry; and Fryston-hall, Ferrybridge, Yorkshire.

1856 Hovell, William Hilton, Esq. Goulburn, New South Wales. Care of Mr. W. Chamberlin, 74, Fleet-street, E.C.

1874 Howard, A. C., Esq. 27, Devonshire-place, Portland-place, W.

1869 Howard, John, Esq., C.E. Exmouth, Devon.

1875 Howard, Joseph, Esq. Tottenham-green, N.

1873 Howard, Morgan, Esq. Temple, E.C.

1857 1370 Howard, Samuel Lloyd, Esq. Goldings, Loughton, Essex.

1873 Howard, William, Esq. 3, Roslyn-bank, Lyndhurst-road, Hampstead, N.W.

1875 Hozier, Capt. Jno. W. (Scots Greys). Cavalry Brigade-office, Aldershot.

1842 *Hubbard, Rt. Hon. J. Gellibrand, M.P. 24, Prince's-gate, Hyde-park, W.

1867 *Hubbard, William Egerton, Esq. Leonardslee, Horsham.

1867 *Hubbard, William Egerton, jun., Esq. Leonardslee, Horsham.

1871 *Hudleston, Wilfred, Esq. 23, Cheyne-walk, S.W.

1872 Hudson, Jno., Esq. 5, Crosby-sq., E.C.; & Thatched-house Club, St. James's, S.W.

1870 Hudson, George B., Esq. Frogmore-hall, Hertford. New University Club, St. James's-street, S.W.

1857 Hughes, Captain Sir Frederic. Ely-house, Wexford.

1873 1380 Hughes, James, Esq. 328, Camden-road, N.

1838 Hughes, William, Esq. 198, Adelaide-road, South Hampstead, N.W.

1875 Hughes, Capt. W. Gwynne, 14, St. James's-square, S.W.

1865 Hughes-Hallett, Capt. Selwyn-court, Richmond, S.W.

1838 *Hume, Edmund Kent, Esq.

Year of Election.

1868 Hunt, John Percival, Esq., M.D. 3, Paradise-place, Green-lanes, N.

1873 Hunt, Jno., Esq. 22, Lancaster-gate, Hyde-park, W.

1874 Hunt, William Thomas, Esq. 1, Pembridge-villas, Bayswater, W.

1868 Hunter, Major Edward. Junior United Service Club, S.W.

1862 Hunter, Henry Lannoy, Esq. Beech-hill, Reading.

1875 1390 Hunter, John, Esq. 9, New-square, Lincoln's-inn, W.C.

1874 Hunter, Capt. J. Edward, R.N. Care of Messrs. Hallett and Co., St. Martin's-place, S.W.; and United Service Club, Pall-mall, S.W.

1872 Hunter, W. W. Esq., LL.D. Bengal.

1870 Hutchins, Edward, Esq. 10, Portland-place, W.

1871 Hutchins, F. Leigh, Esq. 22, Queen's-gardens, Hyde-park, W.

1873 Hutchins, Geo. Albert, Esq. Felsted Pen, Spanish Town, Jamaica.

1871 *Hutchinson, Major Alexr. Hadden, R.A., F.G.S., Garrison Instructor. Bull-point, Devonport.

1872 Hutchinson, Edward, Esq. 8, Sumner-place, South Kensington, W.

1864 Hutchinson, Capt. R. R. Junior St. James's Club, St. James's-street, S.W.

1858 Hutchinson, Thomas J., Esq., F.R.S.L., F.E.S., F.A.S.L. Chimoo-cottage, Mill-hill, N.W.

1874 1400 Hyndman, Hy. Mayers, Esq. 10, Devonshire-street, Portland-place, W.

1870 *Hutton, Charles W. C., Esq. Belair, Dulwich, S.

1860 *Hyde, Captain Samuel. 8, Billiter-square, E.C.

1852 Illingworth, Richard Stonhewer, Esq. 9, Norfolk-crescent, Hyde-park, W.

1875 Impey-Lovibond, Col. Archibald, R.E. 8, The Terrace, Kensington-gdns.-sq., W.

1850 *Imray, James Frederick, Esq. 89, Minories, E.; and Beckenham, Kent, S.E.

1861 *Ingall, Samuel, Esq. Forest-hill, Kent, S.E.

1851 Inglefield, Admiral Edward A., C.B., F.R.S. United Service Club, S.W.; and 10, Grove-end-road, St. John's-wood, N.W.

1871 Inglis, Commander Charles D., R.N. 7, Albemarle-street, W.

1846 Ingram, Hughes Francis, Esq. University Club, S.W.

1869 1410 Inman, R. M., Esq. Edinburgh-House, West-street, Brighton.

1860 *Inskip, Capt. G. H., R.N. 1, Huntiscombe-place, North-road, Plymouth.

1852 *Inskip, Rev. Robert Mills, C.B. 1, Huntiscombe-place, North-road, Plymouth.

1840 *Irby, Frederick W., Esq. Athenæum Club, S.W.

1870 Irvine, James, Esq. 18, Devonshire-road, Claughton, Cheshire.

1875 *Irving, Henry, Esq. 1, Norfolk-place, Child's-hill, N.W.

1864 *Irving, John, Esq. Care of Messrs. Ebsworth and Sons, 4, Corbet-court, Gracechurch-street, E.C.

1861 *Irwin, James V. H., Esq. 4, Boscovel-gardens, Regent's-park, N.W.

Year of Election.	
1873	Jackson, F. H. Ward, Esq. 9, *Albion-street, Hyde-park, W.*
1871	Jackson, Henry, Esq., Lieut. late I.N. (Chief Surveyor of the Province of Wellington). *New Zealand.*
1871	1420 Jackson, Richd. Belgrave, Esq. 16, *Addison-terrace, Kensington, W.*
1866	Jackson, Robert Ward, Esq. 28, *Inverness-road, Hyde-park, W.*
1871	Jackson, Thos. Hughes, Esq. *Manor-house, Birkenhead.*
1855	Jackson, William, Esq. 44, *Portland-place, W.*
1871	Jackson, Wm. Chas., Esq. *Universities Club*, 71, *Jermyn-street, S.W.*
1862	Jacomb, Thomas, jun., Esq. 23, *Old Broad-street, Gresham-house, E.C.*
1861	James, William Bosville, Esq. 13, *Blomfield-road, Maida-hill, W.*
1870	James, William Morris, Esq. 8, *Lyndhurst-road, Hampstead, N.W.*
1868	Jamieson, Hugh, Esq. *Junior Carlton Club, S.W.*
1868	Jamieson, Robert Alexander, Esq., M.A. *Shanghai. Care of J. P. Watson, Esq., St. Dunstan's-buildings, St. Dunstan's-hill, E.C.*
1862	1430 *Jaques, Leonard, Esq. *Wentbridge-house, Pontefract, Yorkshire.*
1863	*Jardine, Andrew, Esq. *Lanrick-castle, Stirling.*
1863	*Jardine, Robert, Esq. *Castlemilk, Lockerby, N.B.*
1875	*Jardine, Robert, Esq. *Thatched House Club, St. James's-street, S.W.*
1871	Jarrad, Lieut. F. W., R.N. *H.M.S. 'Porcupine, and Avon-house, Langley-burrel, near Chippenham.*
1875	Jeffs, Richard, Esq. 244, *Regent-street, W.*
1872	Jeffreys, A. F., Esq. *Fernhill, Bournemouth; and* 21, *Sackville-street, W.*
1865	Jeffreys, J. Gwyn, Esq., LL.D., F.R.S. *Ware-priory, Herts.*
1860	*Jejeebhoy, Sir Jamsetjee, Bart. *Bombay.*
1854	Jellicoe, Charles, Esq. 12, *Cavendish-place, W.*
1854	1440 Jenkins, Capt. Griffith, I.N., C.B. *East India Club, St. James's-square, S.W.; and Little Garth, Welshpool, Montgomeryshire.*
1837	*Jenkins, R. Castle, Esq. *Beachley, near Chepstow.*
1874	*Jenkinson, H. Irwin, Esq. *Keswick, Cumberland.*
1875	Jennings, Samuel, jun., Esq. 58, *Granville-park, Blackheath.*
1854	*Jennings, William, Esq., M.A. 13, *Victoria-street, Westminster, S.W.*
1871	Jenoure, Alfred, Esq.
1874	Jeppe, Le Chevalier Fred. *Care of Portuguese Consulate*, 8, *St. Mary Axe, E.C.*
1860	Jermyn, Rowland Formby, Esq. *War-office, S.W.*
1873	Jervis, Theodore, Esq. 2, *Neville-street, Onslow-gardens, W.*
1870	Jessop, Captain Thomas. *Honley, Huddersfield.*
1860	1450 Jessopp, Rev. Augustus, M.A., Head Master, King Edward VI. School. *Norwich.*
1864	*Jeula, Henry, Esq. *Lloyd's, E.C.*
1874	Jeune, Fras. H., Esq. 3, *Howick-place, Victoria-street, S.W.; and* 1, *Harcourt, Temple, E.C.*
1873	Jocelyn, Hon. W. Nassau, Secretary of Legation. *Stockholm.*
1859	*Johnson, Henry, Esq. *Worthing, Sussex.*
1854	Johnson, John Hugh, Esq.

Year of Election.	
1866	Johnson, W. H., Esq., Civil Assistant G. T. S. India. 17, *Richmond-road, Bayswater, W.*
1868	*Johnston, Alexander Keith, jun., Esq.
1874	*Johnston, Capt. H. B. *United Service Club, Dublin; and Junior Carlton Club, Pall-mall, S.W.*
1857	Johnston, J. Brookes, Esq. 29, *Lombard-street, E.C.*
1875	1460 Johnston, Robert, Esq. 44, *Milner-square, Islington, N.*
1871	Johnston, T. B., Esq., F.R.S.E. 4, *St. Andrew-square, Edinburgh.*
1875	*Johnston, A., Esq. 18, *Paternoster-row, E.C.*
1868	Johnston, Thomas, Esq. 12, *Belvedere, Bath; and King Edward VI. Grammar-school, Bath.*
1866	Johnstone, Colonel H. C., C.B., F.R.A.S. *Murree, Punjaub, India. Care of Messrs. H. S. King and Co., Cornhill, E.C.*
1867	*Johnstone, John, Esq. *Castelnau-house, Mortlake, S.W.*
1874	Johnstone, M. Butler, Esq., M.P. 8, *Seamore-place, Mayfair. W.*
1873	Johnstone, W. Woods, Esq., M.D. 44, *Prince's-square, W.*
1872	Jolley, Wm. Rowe, Esq., M.A., Hon. Chaplain to the Queen. *North Repps rectory, Norwich.*
1875	Jones, Arthur W., Esq. 5, *Eccleston-square, S.W.*
1874	1470 Jones, Edwin, Esq. (Mayor of Southampton). *Woodlands, Bassett, Southampton.*
1864	Jones, Capt. Felix, late I.N. *Fernside, Church-rd., Westow-hill, Upper Norwood, S.*
1868	Jones, Captain H. M., V.C.
1857	Jones, Lieut.-Col. Jenkin, Royal Engineers.
1862	Jones, John, Esq. 338, *Strand, W.C.*
1873	Jones, Rev. John. 11, *Petherton-road, Canonbury.*
1872	Jones, Staff-Commander Jno., R.N. 6, *Edwardes-square, Kensington, W.; and The Blue Bell, Welshpool, Montgomeryshire.*
1871	Jones, Robert, Esq. *The Manor-house, St. John's-wood-park, N.W.*
1861	Jones, Sir Willoughby, Bart. *Cranmer-hall, Fakenham, Norfolk.*
1873	Jones, Winslow, Esq. *Heavitree, near Exeter.*
1867	1480 *Jordan, Wm. Leighton, Esq. 1, *Powis-square, Notting-hill, W.*
1863	Joshua, Moss, Esq. *Melbourne.*

1873	Kane, Dr. William. *Dinan, Cotes du Nord, France.*
1868	Kantzow, Capt. H. P. de, R.N. 5, *Prince of Wales-terrace, Kensington-palace.*
1858	Kay, David, Esq. 19, *Upper Phillimore-place, Kensington, W.*
1865	Kaye, Sir J. W., K.C.S.I., F.R.S. *India-office, S.W.*
1857	Keating, Hon. Sir Henry Singer. 11, *Prince's-gardens, S.W.*
1873	*Keightley, Alfred D., Esq. *Milnthorpe, Penrith, Westmoreland.*
1875	Keir, Campbell M., Esq. *Oriental Club, Hanover-square, S.W.*
1875	Keir, Jno. Lindesay, Esq. 92, *Gloucester-terrace, Hyde-park, W.*
1863	1490 Keir, Simon, Esq. *Conservative Club, S.W.*

Year of Election.

1860 *Kemball, Maj.-Gen. Sir Arnold Burrowes, K.C.S.I., C.B., Indian Army. *United Service Club, S.W.*

1869 Kemp, Geo. L., Esq., Calcutta. *Care of Mr. O'Hagan, 3, Waterloo-place, Pall-mall, S.W.*

1873 Kemp, Rev. Henry William, B.A. *The Charter-house, Hull.*

1863 Kempster, J., Esq. *1, Portsmouth-place, Kennington-lane, Surrey, S.E.*

1861 Kennard, Adam Steinmetz, Esq. *7, Fenchurch-street, E.C.*

1871 Kennedy, Henry Hyndham, Esq. *5, Clarendon-place, Hyde-park-gardens, W.*

1874 Kennedy, John, Esq., M.D. *East India United Service Club, 14, St. James's-square, S.W.*

1854 Kennedy, Rev. John, M.A. *4, Stepney-green, E.*

1875 Kennedy, Rear-Admiral Jno. Jas., C.B. *United Service Club, Pall-mall.*

1871 1500 Kennion, Rev. George Wyndham, B.A. *St. Paul's-vicarage, Hull.*

1871 Kenrick, George, Esq.

1875 Kent, Fras. A., Esq. *Kesgrave-hall, Suffolk.*

1872 Kerr, Alexander, Esq. (Banker), Wellington, New Zealand. *Care of Norman S. Kerr, Esq., M.D., 42, Grove-road, St. John's-wood, N.W.*

1863 Kerr, Staff-Commr. J. H., R.N. *Hydrographic-office, S.W.*

1874 Kerr, Major-General, Lord Mark, C.B. *18, James-street, Buckingham-gate, S.W.*

1862 Kershaw, Wm., Esq. *16, St. Mary Axe, E.C.; and Suffolk-lodge, Brixton-road, S.W.*

1857 Keysell, Francis P., Esq. *Grove-house, Cheshunt.*

1864 *Kiddle, Staff-Commr. W. W. *6, Fernhill-road, Bootle, Liverpool.*

1874 Killam, Frank, Esq. *Yarmouth, Nova Scotia.*

1864 1510 Kimber, Dr. E. *13, Park-villas, Shepherd's-bush, W.*

1874 Kincaid, Thomas, Esq. *9, Lansdown-crescent, Glasgow.*

1874 King, Hon. J. P. Locke. *38, Dover-street, W.; and Brooklands, near Weybridge, Surrey.*

1846 King, Lieut.-Colonel Edward R., 36th Regiment. *Junior United Service Club, S.W.*

1870 King, Henry S., Esq. J.P. *65, Cornhill, E.C.; 45, Pall-mall, S.W.; Manor-house, Chigwell, Essex; and Junior Carlton Club, S.W.*

1872 King, James, Esq. *12, Claremont-terrace, Glasgow.*

1866 King, John, Esq. *Compton-field-place, Guildford, Surrey.*

1861 King, Lieut.-Col. W. Ross, Unatt., F.S.A. Scot. *21, Wilton-street, Belgravia, S.W.; and Tertowie, Kinellar, Aberdeenshire; and Army and Navy Club, S.W.*

1873 *Kingsley, Maurice, Esq. *Eversley-rectory, Winchfield, Hants.*

1857 *Kinnaird, Hon. Arthur F., M.P. *2, Pall-mall-east, S.W.*

1867 1520 Kinnaird, George William Fox, Lord, K.G. *Rossie-priory, Inchture, N.B.; and 33, Grosvenor-street, W.*

1858 Kirk, John, Esq., M.D.

1863 Kirke, John, Esq., Barrister. *C. Thorold, Esq., Welham, Retford, Notts.*

1870 Kirkland, Major-Gen. John A. Vesey. *Wester Fordel, Milnathort, N.B.*

Year of Election.

1868 Kisch, Daniel Montagu, Esq. 47, *Gloucester-square, Hyde-park, W.*

1866 *Kitson, James, jun., Esq. *Spring-bank, Headingley, Leeds.*

1868 Kitto, Richard L. Middleton, Esq. *Preston-lodge, Prestonpans, N.B.*

1835 *Kjaer, Thomas Andreas, Esq. *Gathersgaden* No. 26, *Copenhagen.*

1867 Knight, Andrew Halley, Esq. *Care of R. Philpott, Esq.*, 3, *Abchurch-lane, E.C.*

1862 Knollys, General Sir William T., K.C.B. *Eaton-square, S.W.*

1871 1530 Knollys, Major W. W., 93rd Highlanders. *Woolwich.*

1874 Knowles, George, Esq., C.E. 11, *Queen's-gardens, Hyde-park, W.*

1867 Knox, Alex. A., Esq. 91, *Victoria-street, Westminster, S.W.*

1861 Knox, Thomas G., Esq. *India. Care of Messrs. H. S. King and Co.*, 45, *Pall-mall, S.W.*

1875 Koppel, S., Esq. 64, *Kensington-gardens-square, W.*

1866 Kopsch, Henry, Esq. *Custom-house, Shanghai, and* 8, *Storey's-gate, S.W.*

1861 Kyd, Hayes, Esq., M.R.C.S. *Wadebridge, Cornwall.*

1859 Labrow, Lieut. Colonel Valentine H., F.S.A., F.G.S. *Mitre-court-chambers, Temple, E.C.; and Club-chambers, S.W.*

1849 *Laffan, Colonel Robert Michael, R.E. *Army and Navy Club, S.W.*

1870 Laing, Arthur, Esq. 29, *Mincing-lane, E.C.*

1869 1540 Lamb, Hon. Edward William. *Brisbane, Queensland, Australia.*

1859 Lamb, Lieut. Henry, I.N. *H.M. India Store Department, Belvedere-road, Lambeth, S.*

1863 *Lambert, Alan, Esq. *Heath-lodge, Putney-heath, S.W.*

1864 Lambert, Charles, Esq. 2, *Queen-street-place, Upper Thames-street, E.C.*

1861 Lamont, James, Esq. 4, *Queen-street, Mayfair, W.*

1870 Lamplough, Charles Edward, Esq. *City of London Club, E.C.*

1866 Lampray, John, Esq. 16, *Camden-square, N.W.*

1867 Lamprey, Surgeon-Major Jones, 67th Regiment. *Care of J. H. Lamprey, Esq.*, 17, *St. Ann's-hill, Wandsworth-common, S.W.*

1864 Lampson, Sir C. M., Bart. 80, *Eaton-square, S.W.*

1838 *Lance, John Henry, Esq., F.L.S. *The Holmwood, Dorking.*

1859 1550 *Lange, Sir Daniel A. 21, *Regent-street, W.*

1856 *Langler, John R., Esq., B.A. *Elm-villas*, 30, *Bridge-road-west, Battersea, S.W.*

1865 Langley, Edward, Esq. *Well-hall, Eltham, Kent.*

1871 Langworthy, Edward, Esq. *Brookfield, Ryde, Isle of Wight.*

1870 Lanyon, Charles, Esq. 3, *Paper-buildings, Temple, E.C.*

1833 *Larcom, Major-General Sir Thomas Aiskew, Bart., R.E., K.C.B., F.R.S. *Heathfield, Fareham, Hants.*

1872 Larcom, Lieut. T. H. *Care of Messrs. Stilwell*, 22, *Arundel-street, W.C.*

1861 Lardner, Colonel John. *United Service Club, S.W.*

Year of Election.

1873 Large, Robert Emmott, Esq. *Vernon-lodge, Teddington; and* 13, *South-square, Gray's-inn, W.C.*

1859 Larnach, Donald, Esq. 21, *Kensington-palace-gardens, W.*

1870 1560 Lasseter, Frederic, Esq. 5, *Porchester-gate, Hyde-park, W.*

1864 Latrobe, Ch. J., Esq. *Clapham-house, Lewes, Sussex.*

1870 Laughton, Lieut.-Col. George Arnold, Bombay Staff Corps. *Superintendent Bombay Survey, Bombay.*

1869 Laughton, J. K., Esq. *Royal Naval College, Greenwich.*

1873 Law, Geo., Esq. 1, *Raymond-buildings, Gray's-inn, W.C.*

1846 *Law, Hon. H. Spencer, M.A. 36, *Eccleston-square, S.W.*

1873 Law, Jas., Esq. 544, *Oxford-street, W.C.*

1874 *Lawes, Robert Murray, Esq. 9, *Clarges-street, Piccadilly, W.*

1870 Lawrence, Alexander, Esq. *Clyde-house, Thurlow-road, Hampstead; and Windsor-chambers, Great St. Helen's, E.C.*

1874 Lawrence, Fred. W., Esq. *Oakleigh, Beckenham, Kent.*

1870 1570 Lawrence, Lord, G.C.B., G.C.S.I. 26, *Queen's-gate, W.*

1870 *Lawrence, Philip Henry, Esq. 12, *Whitehall-place, S.W.*

1873 Lawrence, W. F., Esq. *New University Club, W.*

1873 Lawrence, W. L., Esq. *Sevenhampton-manor, Andoversford, Gloucester.*

1868 Lawrie, James, Esq. 63, *Old Broad-street, E.C.*

1867 Lawson, William, Esq. 21, *Walham-grove, Fulham, S.W.*

1862 *Lay, Horatio N., Esq.

1857 Layard, Right Hon. Austen H., D.C.L.

1866 *Layard, Captain Brownlow Villiers, 3rd West India Regt. *Junior United Service Club; and* 38, *Upper Mount-street, Dublin.*

1863 *Leaf, Charles J., Esq. *Old Change, E.C.; and The Rylands, Norwood, S.E.*

1874 1580 Leared, Jno., Esq. 12, *Old Burlington-street, W.*

1874 Learmonth, Andrew James L., Esq. *Junior United Service Club, S.W.*

1873 Leaver, J. Cristopher, Esq., *Rostherne-house, Castlenau, Barnes, Surrey.*

1866 Lebour, G. A., Esq. *Weedpark-house, Dipton, Lintz-green, Durham.*

1853 *Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, N.W.*

1861 Leckie, Patrick C., Esq. 7, *Palace-road, Roupell-park, Streatham, S.*

1870 Lecky, Squire Thornton Stratford, Esq., Lieut. Royal Naval Reserve. 171, *Duke-street, Liverpool, N.*

1868 Lee, John, Esq. *Grosvenor-cottage, Loughborough-road, S.W.*

1873 Lee, John Dunkin, Esq. *Northwood-park, Cowes, Isle of Wight.*

1874 1590 Leeman, George, Esq., M.P. 7, *Dean's-yard, Westminster, S.W.*

1874 Leeman, Rev. W. L. *Rector of Middleton St. George, Darlington.*

1869 *Lees, Lieutenant-Colonel Nassau, D.C.L. *Athenæum Club, S.W.*

1865 Le Feuvre, W. H., Esq., C.E. 68, *Bedford-gardens, Kensington, W.*

1833 *Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 18, *Spring-gardens, S.W.*

1853 Lefroy, General John Henry, R.A., F.R.S. *Athenæum Club, S.W.*

1862 Leggatt, Clement Davidson, Esq. 1, *Pinner's-court, Old Broad-street, E.C.*

Year of Election.

1861 Legh, William John, Esq. 38, *Belgrave-square, S.W.; and Lyme-park, Cheshire.*

1861 *Lehmann, Frederick, Esq. 15, *Berkeley-square, W.*

1845 Leigh, John Studdy, Esq., F.G.S. 6, *Talbot-road, Westbourne-park, W.*

1869 Leigh, Roger, Esq. *Barham-court; and Hindley-hall, Hindley.*

1863 1600 Le Mesurier, Henry P., Esq., C.E. 21, *Stanley-crescent, Kensington-park, W.*

1874 Le Pays, Geo. Renatus, Esq. 38, *Brunswick-terrace, Brighton; and Thatched-house Club, S.W.*

1856 Leslie, The Hon. G. W. *Leslie-house, Leslie, N.B.*

1873 Leslie, William, Esq. *Warthill, Aberdeenshire, N.B.; and Carlton Club, Pall-mall, S.W.*

1867 L'Estrange, Carleton, Esq. *Carlton Club, S.W.*

1873 Letts, Thomas, Esq. 2, *Crown-buildings, Queen Victoria-street, E.C.*

1857 Leverson, George B. C., Esq. 18, *Queensberry-place, Cromwell-road, S.W.*

1869 Leveson, Edward J., Esq. *Cluny, Crescent-wood-road, Sydenham-hill, S.E.*

1874 Levin, Nathaniel, Esq. 44, *Cleveland-square, W.*

1873 Levi, Professor Leone, F.S.A., &c., Doc. Pol. Econ. Univ. Tub. 19, *Richmond-crescent, Barnsbury, N.; and Farrar's-buildings, Temple, E.C.*

1859 1610 Levinsohn, Louis, Esq. *Vernon-house, Clarendon-gardens, Maida-hill, W.*

1873 *Lewin, Frederick Dealtry, Esq. *Morelands, St. John's-park, Blackheath, S.E.*

1869 *Lewin, Capt. Thomas, Beng. Staff Corps. *East India United Service Club, S.W.*

1872 Lewis, Jos., Esq., R.A. *Castle Carrow, Carrick-on-Shannon.*

1874 Lewis, Rev. R. C., M.A. *Streatham-common, S.W.*

1852 Leycester, Captain Edmund M., R.N. *White-place, near Maidenhead, Berks.*

1859 Lichfield, Thomas George, Earl of. *Shugborough, Staffordshire.*

1872 Liebenrood, Captain J., R.N. *Belmont-lodge, Lee, Kent; and 35, Moray-place, Edinburgh.*

1869 Ligar, C. W., Esq., Surveyor-General of Victoria. 4, *Royal Exchange-avenue, E.C.; and Melbourne, Australia.*

1870 Light, Rev. John. 13, *Notting-hill-terrace, W.*

1856 1620 Lilford, Thomas Lyttleton Powys, Lord. 10, *Grosvenor-place, W.*

1860 Lindsay, H. Hamilton, Esq. *Windham-place, Bryanston-square.*

1870 Lindsay, Lord., M.P. 47, *Brook-street, Grosvenor-square, W.*

1867 *Lindsay, Colonel Robert J. L., M.P., V.C. *Lockinge-house, Wantage, Berks; and 2, Carlton-gardens, S.W.*

1855 *Lindsay, William S., Esq. *Manor-house, Shepperton, Middlesex.*

1869 Lindsey, Mark John, Esq. 32, *Ludgate-hill, E.C.; and Burnt-ash-lane, Lee, Kent.*

1868 Linton, Robert P., Esq., F.R.C.S., M.R.I. 14, *St. James's-square, S.W.*

1875 Lister, Isaac S., Esq. *The Heath, Hampstead, N.W.*

1866 Little, Archibald J., Esq. *Shanghai; and 18, Park-street, Grosvenor-square, W.*

1871 Little, Simon, Esq. *Calantra-house, Wexford, Ireland.*

1870 1630 Littleton, The Hon. Henry S. *Teddesley, Penkridge, Staffordshire.*

1875 Lloyd, Capt. C. Henry. *Care of Jno. Jupp and Co., 113, Fenchurch-street, E.C.*

1874 Lloyd, Francis Aylmer, Esq. 23, *Queen's-terrace, Finchley-road, N.W.*

Year of Election.	
1857	*Lloyd, Hon. George A. *Sydney, N. S. W.; George-yard, Lombard-street, E.C.*
1873	Lloyd, Percival, Esq. *The Limes, Crouch-hill, Hornsey.*
1863	Lloyd, Sir Thomas Davis, Bart. *United University Club, S.W.; and Bronwydd, Carmarthen.*
1864	*Lloyd, W., Esq. *Myood-house, Wednesbury, Staffordshire.*
1867	Lloyd, Rev. William V., M.A.
1861	Lluellyn, Capt. Richard. 20, *Montagu-square, W.*
1869	Lluellyn, Major William R., R.A. *Shoeburyness, Essex.*
1868	1640 Lobley, James Logan, Esq., F.G.S. 59, *Clarendon-road, W.*
1872	Lobo, Manoel da Gama, Esq., M.D. *Rio de Janeiro.*
1863	Loch, George, Esq.
1859	Loch, Henry Brougham, Esq. *Government-house, Isle of Man.*
1861	Loch, John Charles, Esq. *Hong-Kong.*
1857	Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.*
1874	Lock, Alfred G., Esq., F.R.C.S. *Roselands, Millbrook, Southampton.*
1864	Locke, John, Esq. 83, *Addison-road, Kensington, W.*
1858	Lockhart, William, Esq., F.R.C.S. *Park-villas, 67, Granville-park, Blackheath, S.E.; and China.*
1868	Lockhart, Captain Wm. Stephen Alexander.
1874	1650 *Loder, Edmund Giles, Esq. 42, *Grosvenor-square, S.W.*
1872	Logan, Sir T. Galbraith, K.C.B., M.D. 40, *Hyde-park-square, W.*
1856	Logan, Sir William Edmond, F.R.S. *Montreal, Canada.*
1868	Lomonossoff, M. Alexis de. *Assist.-Sec. Geographical Society, St. Petersburg.*
1860	Londesborough, Wm. Henry Forester, Lord. 38, *Berkeley-square, W.*
1874	Longbottom, A. P., Esq., C.E. *Hamlet-house, Hammersmith, W.*
1830	*Long, George, Esq., M.A. 2, *Rhine-villas, Portfield, Chichester.*
1874	Long, Rev. James. 14, *Salisbury-square, Fleet-street, E.C.*
1857	*Long, W. Beeston, Esq.
1872	Longden, J. R., Esq. *Government-house, Trinidad. Care of Mr. A. Walker, 13, King's-road, Bedford-row, W.C.*
1865	1660 *Longley, Lt.-Col. George, R.E. *Brookes's Club, St. James's-street, S.W.*
1847	Longman, Thos., Esq. *Paternoster-row, E.C.*
1858	Longman, William, Esq. 36, *Hyde-park-square, W.*
1870	*Longstaff, Capt. Llewellyn Wood. *Summergangs-hall, Hull.*
1861	Lonsdale, Arthur Pemberton, Esq.
1860	Looker, William Robert, Esq. *Melbourne, Australia. Care of Mr. Ashhurst, 9, Fenchurch-street, E.C.*
1873	Lord, W. Barry, Esq. *Downshire-hill-cottage, Hampstead, N.W.*
1874	Lorne, The Most Hon. the Marquis of, K.T., M.P. 1, *Grosvenor-crescent, S.W.*
1864	Lothian, William Schomberg, Marquis of. 15, *Bruton-street, W.*
1873	Lovell, Thomas, Esq., M.I.C.E. *Lucknow, India.*
1873	1670 Lovett, Major Beresford, R.E. *East India United Service Club, 14, St. James's-square, S.W.*

Year of Election.	
1856	Lovett, Phillips Cosby, Esq. *Liscombe-house, Liscombe, Leighton Buzzard, Bucks.*
1867	Low, Alex. F., Esq. 84, *Westbourne-terrace, W.*
1875	Low, Chas. R., Esq. (Lieut. late I.N.) 16, *Glebe-place, Chelsea, S.W.*
1863	Low, S. P., Esq. 55, *Parliament-street, S.W.*
1858	Lowden, Rev. George Rouse. *St. Leonard-villa, Hanwell, Middlesex.*
1859	Lowe, Captain W. Drury. *Myria, Bettws-y-Coed, Llanrwst, North Wales.*
1830	Lowry, Joseph Wilson, Esq. 39, *Robert-street, Hampstead-road, N.W.*
1873	*Lowther, Capt. Marcus, R.N. *Thornton, Ryde.*
1860	Loyd, Colonel W. K. *Union Club, S.W.*
1870	1680 Luard, Captain Charles Edward, R.E. *War-office, Whitehall.*
1873	Luard, Colonel R. G. A. *Care of Cox and Co., Craig's-court, S.W.*
1866	Luard, Wm. Charles, Esq. *Llandaff-house, Cardiff; and Athenæum Club, S.W.*
1871	*Lubbock, Sir John, Bart., M.P., F.R.S., &c. *High-elms, Beckenham, Kent.*
1875	Lucas, Louis Arthur, Esq. 2, *Patshull-place, Patshull-road, Kentish-town.*
1875	Luckman, Alfred, Esq. 33, *Child-street, Newtown, Reading.*
1871	Ludlow, Edgar John David, Esq. *Care of Geo. Perry, Esq.*, 67, *Charlewood-street, St. George's-road, S.W.*
1873	Lugard, General Right Hon. Sir Edward, G.C.B. *E* 3, *Albany, W.*
1872	*Lumsden, Colonel P. S., C.S.I., Quartermaster-General, Bengal Army. *United Service Club, Pall-mall, S.W.*
1860	Lush, Sir Robert, Q.C. *Balmoral-house, Avenue-road, Regent's-park, N.W.*
1873	1690 *Lushington-Tilson, Rev. W. R. Tilson Marsh, M.A. *Oxford and Cambridge Club, S.W.; Conservative Club, W.; and Stretham Manor, Isle of Ely.*
1870	Lyall, George, Esq. 43, *Queen's-gate-terrace, S.W.; and Hedley, near Epsom.*
1873	Lycett, Sir Francis, K.C.B. 18, *Highbury-grove, Highbury, N.*
1866	Lydall, J. H., Esq. 12, *Southampton-buildings, Chancery-lane, W.C.*
1873	Lydgate, Robert, Esq. *Middle School, Peckham, S.E.*
1873	Lydgate, Wm., Esq. *The Castle School, Guildford.*
1869	Lye, John Gaunt, Esq. 18, *Prince of Wales-terrace, Kensington, W.*
1861	*Lynch, Thomas Kerr, Esq. 31, *Cleveland-square, Hyde-park, W.*
1858	Lyne, Francis, Esq.
1875	Lyne, Robt. E., Esq. *Sandymount, near Dublin.*
1873	1700 Macaulay, William, Esq. 122, *Leadenhall-street, E.C.*
1863	Macbraire, James, Esq. *Broadmeadows, Berwick-on-Tweed.*
1874	Macdonald, Colonel John (Beng. Staff Corps). *Care of Messrs. Grindlay and Co.*, 55, *Parliament-street, S.W.*
1871	Macdonald, William, Esq. *Yokohama, Japan.*
1843	Macdonnell, Sir Richard Graves, K.C.M.G., C.B. *Athenæum Club, Pall Mall.*
1873	MacEachen, Archibald, Esq. 56, *Brunswick-street, Glasgow.*
1865	Macfarlan, John G., Esq. *The Tower, Richmond-bridge.*

Year of Election.

1874 Macfarlane, Donald H., Esq. 62, *Portland-place, W.*

1868 MacGregor, Lieut.-Col. C. M. *Bengal.*

1855 MacGregor, Duncan, Esq. *Athenæum Club, S.W.*

1872 1710 *MacGregor, John, Esq., M.A. *Athenæum Club, S.W.*

1845 *Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 1, *Maida-vale, W.*

1868 Mackay, Dr. A. E., R.N. *Admiralty, Somerset-house, W.C.*

1859 Mackay, Rev. Alexander, LL.D. 2, *Hatton-place, Grange, Edinburgh.*

1870 Mackay, Nevile F., Esq. 2, *Elm-court, Temple, E.C.*

1859 *Mackean, Thomas W. L., Esq. *Bank of British Columbia*, 5, *East India-avenue, E.C.*

1873 Mackelvie, Jas. Tannock, Esq. 21, *Victoria-street, S.W.; and* 7, *Albemarle-street, W.*

1845 Mackenzie, Right Hon. Holt, F.R.A.S. *Athenæum Club, S.W.; and* 28, *Wimpole-street, W.*

1860 *Mackenzie, James T., Esq.

1863 Mackenzie, John H., Esq. 65, *Cornwall-gardens, South Kensington.*

1873 1720 Mackenzie, William, Esq., M.D., C.B. 3, *Talbot-square, Hyde-park, W.; and East India United Service Club, S.W.*

1864 *Mackeson, Edward, Esq. 13, *Hyde-park-square, W.*

1874 *Mackinlay, Andrew U., Esq. 39, *Holland-park, W.*

1862 Mackinlay, D., Esq. *Oriental Club, W.*

1867 Mackinlay, John, Esq., J.P., M.I.C.E., Chief Engineer and Inspector of Machinery, H.M. Dockyard, and Surveyor to the Port, Bombay. *Care of Charles Bannerman, Esq.*, 193, *Camberwell-new-road, Kennington, S.E.*

1864 Mackinnon, C. D., Esq. *Care of Messrs. J. Clinch and Sons*, 31, *Abchurch-lane, E.C.*

1855 *Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.*

1865 *Mackinnon, W., Esq. *Balinakiel-by-Harbert, Argyleshire.*

1872 Mackintosh, Alex, Esq. 9, *Talbot-square, Hyde-Park, W.*

1861 Mackintosh, Alexander Brodie, Esq. *Oriental Club, W.; and Dunoon, Scotland.*

1860 1730 Mackirdy, Major-Gen. Elliot, 69th Regiment. *U.S. Club, S.W.*

1873 Mackley, Thomas Cole, Esq. *Ferndale, Streatham.*

1871 Maclagan, Colonel Robert, R.E. *Care of Messrs. Crawford, Colvin, and Co.*, 71, *Old Broad-street, E.C.*

1871 Maclaine, Murdoch G., Esq. 6, *Princes-square, Bayswater, W.*

1860 Maclean, William Crighton, Esq., F.G.S. 31, *Camperdown-pl., Great Yarmouth.*

1859 MacLeay, George, Esq. *Pendell-court, Bletchingley.*

1870 MacLeod, Lieut. Angus, R.N. *Care of Messrs. Hallett and Co.*, 7, *St. Martin's-place, W.C.*

1855 Maclure, Andrew, Esq. *Maclure, Macdonald, and Macgregor*, 37, Walbrook, E.C.

1861 Maclure, John William, Esq. *The Home, Whalley-range, Manchester.*

1861 Macmillan, Alex., Esq. 16, *Bedford-street, Covent-garden, W.C.*

1874 1740 MacMurdo, Major-General, C.B. *Rose-bank, Fulham.*

1871 Macnab, Duncan Macpherson, Esq. *Union Club, S.W.*

Year of Election.

1855 Macnab, John, Esq. *Findlater-lodge, Trinity, near Edinburgh.*

1868 Macnair, George, Esq. *Oriental Club, Hanover-square, W.*

1874 Macnamara, Surg.-Maj. F. N., M.D. (Indian Army). 28, *Palace-gardens-terr., W.*

1871 Macpherson, Daniel, Esq. *Cadiz; and* 1, *King-street, St. James's, S.W.*

1871 Macpherson, Hugh Martin, Esq. *E. I. United Service Club, S.W.*

1861 Macpherson, William, Esq. *Ruskin-house, Putney.*

1870 Macturk, John, Esq. 2, *Cecil-street, Hillhead, Glasgow.*

1871 MacVicar, Lieut. Jno. A., 93rd Highlanders. *North Camp, Aldershot.*

1873 1750 McAlpin, Donald A. L., Esq., R.N. *H.M.S. 'Favourite,' Queensferry, N.B.*

1873 McAlpin, Kenneth W. A. G., Esq. *Warsaw-villa, Aldershot.*

1863 McArthur, Alex., Esq. *Raleigh-hall, Brixton-rise, Brixton, S.W.*

1867 McArthur, William, Esq. 1, *Guyder-houses, Brixton-rise, S.W.*

1872 McCall, John, Esq. 17, *Gracechurch-street, E.C.*

1860 McClintock, Admiral Sir Francis Leopold, F.R.S. *United Service Club, S.W.; and H.M. Dockyard, Portsmouth.*

1871 *McClure, Joseph Henry, Esq. 9, *Rumford-place, Liverpool.*

1861 *McConnell, W. R., Esq., Barrister-at-Law. 12, *King's-Bench-walk, Temple, E.C.; and Charleville, Belfast.*

1862 McCosh, John, Esq., M.D. *Junior United Service Club, S.W.*

1866 McNair, Major John F. A., R.A.

1865 1760 McDonald, James, Esq. *Oriental Club, Hanover-square, W.*

1865 McEuen, D. P., Esq. 24, *Pembridge-square, Bayswater, W.*

1874 McGarvin, Alan Lawrie, Esq. *Cordon-lodge, Wanstead; and* 2, *Barge-yard, Victoria-street, S.W.*

1867 McGregor, Duncan, Esq. *Clyde-place, Glasgow.*

1869 McGrigor, Alexander Bennett, Esq. 19, *Woodside-terrace, Glasgow.*

1874 McIlwraith, Robert, Esq. 36, *Prince's-gate, S.W.*

1866 *McIvor, W. G., Esq., *Sup. of Chinchona Plantations, Ootacamund, Madras. Care of Mr. E. Bumpus, Holborn-bars, E.C.*

1858 McKerrell, Robert, Esq. 45, *Inverness-terrace, W.; and Mauritius.*

1873 McKerlie, P. H., Esq., F.S.A., Scot., &c. 26, *Pembridge-villas, Bayswater, W.*

1868 MClean, Frank, Esq., M.A., C.E. *Ferncliffe, Tunbridge-wells.*

1867 1770 *McLean, Hon. John. *Oamaru, New Zealand. Care of Messrs. Redfern, Alexander, and Co.,* 3, *Great Winchester-street-buildings, E.C.*

1870 McLeod, Major-Gen. W. C. 14, *St. James's-square, S.W.*

1852 M'Leod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.*

1874 McMahon, Colonel A. 46, *Ebury-street, W.*

1875 McMaster, James, Esq. 1, *Stanhope-gardens, Queen's-gate, S.W.*

1839 M'Neil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*

1873 *McVean, Colin A., Esq. Surveyor General of Japan. *Care of Rev. D. McVean, Bunessan, Scotland.*

1872 Magrath, Colonel John R., Madras Artillery, Ret. *Murhill, near Bradford-on-Avon, Wilts; and East India U. S. Club,* 14, *St. James's-square, S.W.*

1874 Maitland, Rev. A. Gray. *Roseneath, Sydenham-park, S.E.*

Year of Election.	
1871	Major, Henry, Esq., B.A. *Sherwood-house, Mansfield-road, Nottingham.*
1845	1780 *Major, Richard Henry, Esq., F.S.A. *Athenæum Club, S.W.; and British Museum, W.C.*
1868	*Makins, Henry F., Esq. 8, *Palace-gate, Kensington, W.; and Reform Club, S.W.*
1858	Malby, John Walter, Esq. 15, *Richmond-villas, Seven-sisters'-rd., Holloway, N.*
1853	*Malby, Thomas, Esq. 2, *Park-villas, Seven-sisters'-road, Holloway, N.*
1862	*Malcolm, Major Edward Donald, R.E. *Chatham.*
1863	Malcolm, James, Esq. 22, *Prince's-gate, Knightsbridge, W.*
1843	*Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
1872	Malleson, Colonel G. B. *Care of Coutts and Co., Strand, W.C.*
1853	*Mallet, Chas., Esq. *Audit-office, W.C.; and 7, Queensbro'-terrace, Bayswater, W.*
1870	Man, Captain J. Alexander (Commissioner of Customs for Newchwang, S. Manchuria.) *Care of P. J. King, Esq., 10, St. Stephen's-square, Bayswater, W.; and Junior United Service Club.*
1872	1790 Man, Captain William. *Care of B. F. Stevens, 4, Trafalgar-square, W.C.*
1872	Man, William, Esq. *Woodford, Essex.*
1875	Manchester, Wm. D. Montagu, Duke of. 1, *Great Stanhope-street, W.*
1874	Mann, H., Esq. *Belgrave-mansions, S.W.; and 2, Upper Brunswick-place, Brighton.*
1860	Mann, James Alexander, Esq., M.R.A.S. *Ingrave-house, Ingrave, by Brentwood. Essex.*
1866	Mann, Robert James, Esq., M.D. 5, *Kingsdown-villas, Wandsworth-common, S.W.*
1866	Manners, George, Esq., F.S.A. *Lansdowne-road, Croydon.*
1868	Manners-Sutton, Graham, Esq., 7, *Gloucester-terrace, Hyde-park, W.*
1874	Manners-Sutton, Hon. Robert Henry. 12, *Queensbury-place, S. Kensington, W.*
1856	Manning, Frederick, Esq. *Byron-lodge, Leamington; and 8, Dover-street, W.*
1864	1800 *Mansell, Captain A. L. *Hydrographic-office, Admiralty, S.W.*
1869	Mantell, Sir John Iles. *Swinton-park, Manchester; and Windham Club, S.W.*
1859	Mantell, Walter Baldock Durant, Esq. *Wellington, New Zealand. Care of J. G. Cooke, Esq., 25, Austin-friars, E.C.*
1873	Mantle, Wm. John, Esq., *Northgate, Lincoln.*
1869	March, Edward Bernard, Esq., H.M. Consul, Callao. *Care of Messrs. F. O'Brien and Co., 43, Parliament-street, S.W.*
1871	Margetts, William G., Esq. *Allamira, Stonebridge, Willesden, N.W.*
1872	Margöschis, John Thomas, Esq. *Care of Mrs. Margöschis, Bredic-villa, Leamington.*
1874	Marjoribanks, Edw., Esq. 134, *Piccadilly, W.*
1873	Markham, Captain Albert Hastings, R.N. 21, *Eccleston-square, S.W.*
1854	Markham, Clements Robert, Esq., C.B., F.R.S. *India-office, S.W.; 21, Eccleston-square, S.W.; and Athenæum Club, S.W.*
1857	1810 Marsh, Matthew Henry, Esq. *Oxford and Cambridge Club, S.W.*
1873	Marshall, Charles H., Esq. *The Cedars, Sydenham, S.E.*

Year of Election.	
1862	*Marshall, J. G. Don, Esq. *Birkenshaw, Hawley, Farnboro'-station, Hants.*
1873	Marshall, John, Esq. *Auckland-lodge, Queen's-road, Richmond, S. W.*
1862	Marshall, William, Esq. 71, *Mornington-road, W.*
1859	*Marsham, The Hon. Robert. 5, *Chesterfield-street, Mayfair, W.*
1857	Marshman, J. C., Esq. 7, *Kensington-palace-gardens, W.*
1875	Marston, Edward, Esq. 188, *Fleet-street, E.C.*
1874	Marten, C. Rous, Esq. *Wellington, New Zealand.*
1871	Marten, Elliott, Esq., Vice-Consul, Sarawak. *Care of W. T. Marten, Esq.,* 30, *Great St. Helen's, E.C.*
1875	1820 Martin, Fras. Offley, Esq. *Rose-hill, Hampton.*
1861	Martin, Henry, Esq. *Sussex-house, Highbury-new-park, N.*
1860	*Martin, Richard Biddulph, Esq. *Clarewood, Bickley, S.E.*
1862	Martin, Thomas, Esq. 5, *Compton-terrace, N.*
1870	Martin, Wm. Coleman, Esq. *Radford-cottage, Worksop, Notts.*
1871	Mason, Charles, A. J., Esq. 3, *Gloucester-crescent, Hyde-park, W.*
1875	Mason, Dr. Samuel, 44, *Finsbury-circus, E.C.*
1874	Mason, Stephen, Esq. *National-bank-buildings, Glasgow.*
1871	Master, Chas. Hoskins, Esq. *Barrow-green-house, Oxted, near Godstone, Surrey.*
1870	Masterman, Edward, Esq. 30, *Threadneedle-street, E.C.; and* 27, *Clement's-lane, Lombard-street, E.C.*
1870	1830 Masterman, Edward, jun., Esq. 57½, *Old Broad-st., E.C.; and Walthamstow.*
1869	*Matheson, Alexander, Esq., M.P. 33, *South-street, Park-lane, W.; and Ardross Castle, Ross-shire, N.B.*
1874	*Matheson, Hugh Mackay, Esq. 3, *Lombard-street, E.C.*
1845	*Matheson, Sir James, Bart., F.R.S. 13, *Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.*
1871	Mathew, George Buckley, Esq. *Care of Messrs. Boddington and Co., St. Helen's-place, E.C.*
1874	Mathews, Chas. Edward, Esq. *Oakgate, Augustus-road, Edgbaston, Birmingham; and Arts Club, W.*
1872	Mathews, William, Esq., M.A. 49, *Harborne-road, Birmingham.*
1858	Mathieson, James Ewing, Esq. 77, *Lombard-street, E.C.; and* 16, *Queen's-gardens, Bayswater, W.*
1873	Maude, Colonel G. A. *Royal Mews, Pimlico, S.W.*
1875	Maule, Geo. Norman, Esq. 1, *Hare-court, Temple; and University Club, S.W.*
1868	1840 Mavrogordato, Lucas, Esq. *Belgrave-mansions, Grosvenor-gardens, S.W.; and Messrs. Ralli, Brothers,* 25, *Finsbury-circus, E.C.*
1871	Mawbey, Henry, Esq. 12, *Clare-road, Cotham, Bristol.*
1872	Maxwell, John, Esq. *Lichfield-house, Richmond.*
1860	*Maxwell, Sir William Stirling, Bart., M.P. 10, *Upper Grosvenor-street, W.; and Keir, Dunblane, N.B.*
1855	May, Staff-Commr. Daniel John, R.N. *Care of Case and Loudonsack,* 1, *James-street, Adelphi, W.C.*

Year of Election.	
1858	Mayer, Joseph, Esq., F.S.A. 68, *Lord-street, Liverpool.*
1861	Mayers, William S. F., Esq., Chinese Secretary, H.B.M. Legation, Pekin. *Care of James West, Esq., 2, Cowper's-court, Cornhill, E.C.*
1875	Maynard, R. Russell, Esq. *Milton-house, Haringly-park, Hornsey.*
1862	Mayne, Captain Richard Charles, R.N., C.B. 80, *Chester-square, S.W.*
1858	Mayo, Captain John Pole. *Army and Navy Club, S.W.*
1867	1850 Mayson, John S., Esq., J.P. 5, *St. James's-square, Manchester.*
1863	Meade, The Hon. Robert Henry. *Colonial-office, S.W.; and* 3, *Belgrave-square, S.W.*
1874	Meadows, Dr. Alfred. 27, *George-street, Hanover-square, W.*
1872	Measom, George Samuel, Esq. *St. Margaret's, Isleworth.*
1871	Medhurst, W. H., Esq. *Athenæum Club.*
1862	*Medlycott, Commander Mervyn B., R.N. *Care of Messrs. Woodhead.*
1874	*Meinertzhagen, Daniel, Esq. 10, *Rutland-gate, S.W.*
1854	Melvill, Major-General Sir Peter Melvill, Mil. Sec. to the Bombay Government. 27, *Palmeira-square, Brighton.*
1838	Melvill, Philip, Esq., F.R.A.S. *Ethy-house, Lostwithiel, Cornwall.*
1871	Mercer, Henry C., Esq., B.A. *Denham-lodge, Uxbridge.*
1875	1860 Mercer, Thomas, Esq. *Uxbridge.*
1868	Merewether, Colonel Sir William Lockyer, K.C.S.I., C.B. *Kurrachee. Care of King and Co.*, 65, *Cornhill*, E.C.
1871	*Merritt, Douglas, Esq. *Lyndhurst, Irvington-on-Hudson, New York, U.S. Care of J. S. Morgan & Co.*, 22, *Old Broad-street, E.C.*
1866	Messiter, Charles A., Esq. *The Avenue, Brampford Speke, near Exeter.*
1871	Messum, Josiah Young, Esq., R.N. (Controller of H.M.'s Packet Service). *General Post-office, E.C.; and Bedford-villa, Sydenham-road, Croydon.*
1867	Metcalfe, Frederic Morehouse, Esq. *Wisbech, Cambridgeshire.*
1874	Methuen, Capt. Hon. Paul (Scots Fusil. Gds.) *Guards' Club, Pall-mall, S.W.*
1871	Methven, Captain Robert. 44, *Chester-square, S.W.*
1837	*Mexborough, John Chas. Geo., Earl of. 33, *Dover-street, W.; and Methley-park, near Leeds.*
1865	*Michell, Lieut.-Colonel J. E., R.H.A.
1868	1870 Michell, Robert, Esq. *India-office, S.W.*
1863	*Michie, A., Esq. 26, *Austin-friars, E.C.*
1873	Michie, Honourable Archibald, Q.C. 5, *Bury-street, St. James's; and Reform Club, S.W.*
1848	Middleton, Rear-Admiral Sir G. N. Broke, Bart. *Broke-hall, Suffolk.*
1870	*Midwinter, William Colpoys, Esq. *Akyab, British Burmah.*
1868	*Miers, John William, Esq., C.E. 74, *Addison-road, Kensington, W.*
1859	Miland, John, Esq. *Clairville, Lansdown-road, Wimbledon.*
1866	Mildmay, Capt. Herbert St. John (Rifle Brigade). 19, *Charles-street, Berkeley-square, W.*
1872	Miles, Captain Samuel Barrett (Bombay Staff Corps), Political Agent in Mekran. *Care of Messrs. Trübner, Ludgate-hill, E.C.*

Year of Election.	
1874	Miller, Capt. David, R.N. *United Service Club, Pall-mall, S.W.*
1861	1880*Miller, Captain Henry Matthew, R.N. *The United Service Club, S.W., and Fernside, Sevenoaks.*
1868	Miller, Robert Montgomerie, Esq. *Culverden-grove, Tunbridge-wells.*
1853	*Miller, Admiral Thomas. *United Service Club, S.W.*
1861	Milligan, Joseph, Esq. 6, *Craven-street, Strand, W.C.*
1857	Mills, Arthur, Esq. 34, *Hyde-park-gardens, W.*
1863	*Mills, John R., Esq. *Kingswood-lodge, Tunbridge-wells.*
1866	Milne, Admiral Sir Alex., K.C.B., G.C.B. 13, *New-street, Spring-gardens, S.W.*
1867	Milner, Rev. John, B.A. *H.M.S. 'St. Vincent.'*
1863	*Milton, Viscount, M.P. 17, *Grosvenor-street, W.*
1862	*Mitchell, George, Esq. 22, *Bolton-street, Piccadilly, W.*
1859	1890Mitchell, Sir William. *Strode, Ivybridge, Devon.*
1872	Mitchell, William Aug., Esq. *Marlboro'-villa, Lea-bridge-road, E.*
1873	Mitford, A. B., Esq. 1, *Albert-terrace, Knightsbridge; and Travellers' Club.*
1874	Mitford, Col. Jno. Philip Osbaldiston. *Mitford-hall, Morpeth, Northumberland; and Army and Navy Club, S.W.*
1851	*Mocatta, Frederick D., Esq. 9, *Connaught-place, W.*
1873	Moffat, Rev. Dr. Robert. 64, *Knowle-road, Brixton-road, S.W.*
1853	Moffatt, George, Esq. 103, *Eaton-square, S.W.*
1868	Moffitt, John, Esq. *General Register Office of Seamen,* 6, *Adelaide-place, London-bridge, E.C.*
1873	Moleyns, Major T. A. de, R.A. *Woolwich.*
1861	Mollison, Alexander Fullerton, Esq.
1870	1900Moneta, Don Pompeio (Chief Engineer, Argent. Repub.). *Buenos Ayres.*
1871	Montagu, Jno. M. P., Esq. *Downe-hall, Bridport, Dorset, and Union Club, S.W.*
1862	*Montague, Major Horace. 11, *Clifton-villas, Maida-hill, W.*
1830	*Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Grosvenor-gate, Park-lane, W.; and East-cliff-lodge, Ramsgate.*
1859	Montgomerie, Lieut.-Colonel T. G., Royal Engineers, F.R.S., Dep. Sup. Trig. Survey. *Care of Messrs. Alexander Fletcher & Co.,* 10, *King's-arms-yard, Moorgate-street, E.C.; and Athenæum Club, Pall-mall, S.W.*
1860	Montgomery, Robert Mortimer, Esq.
1865	Montgomery, Sir Robert, K.C.B., G.C.S.I. 7, *Cornwall-gardens, Queen's-gate, W.*
1874	Moodie, G. P. Esq. 1 *Suffolk-place, Pall-mall, S.W.*
1839	Moody, General R. C., R.E. *Caynham-house, near Ludlow, Shropshire.*
1857	*Moor, Rev. Allen P., M.A., F.R.A.S. *St. Clement's-vicarage, Truro.*
1874	1910Moore, Adolphus W., Esq. *India-office, S.W.*
1863	Moore, H. Byron, Esq. *Survey-office, Melbourne, Australia.*
1861	Moore, John Carrick, Esq., F.R.S. *Corswall, Wigtonshire; Geological Society, W.C.; and* 23, *Bolton-street, W.*
1870	Moore, John, Esq. 7, *Nicholas-lane, Lombard-street, E.C.*
1870	*Moore, Joseph, Esq. *Brookwell-house, Dulwich.*
1872	Mora, Diego d'Uhson, Esq. 2, *Brook-street, Cheetham, Manchester.*

Year of Election.	
1870	Moran, Benjamin, Esq. 20, *Norfolk-terrace, Bayswater, W.; and* 5, *Westminster-chambers, Victoria-street, S.W.*
1872	*Morant, Capt. J. L., L. R. Mad. Eng. *Mountstuart, Ootacamund, Neilgherries, Madras Presidency. Care of Messrs. John Gladding and Sons,* 13, *Pater-noster-row, E.C.*
1863	More, R. Jasper, Esq. *Linley-hall, Salop.*
1869	*Morgan, Delmar, Esq. 15, *Roland-gardens, South Kensington, W.*
1864	1920 Morgan, D. L., Esq., Deputy Inspector-General, R.N. 9, *Spring-gardens, S.W.*
1861	Morgan, Junius Spencer, Esq. 13, *Prince's-gate, Hyde-park, W.*
1866	Morland, Lieut. Henry, late I.N. *Assistant Dockmaster, &c., Bombay.*
1839	*Morris, Charles, Esq. *University Club, S.W.*
1871	Morris, Edwd. Ellis, Esq. *Head-master of the Grammar-school, Melbourne.*
1871	Morris, Rev. R. Leslie, M.A. *Fitzroy-lodge, Highgate.*
1871	*Morrison, Alf., Esq. 16, *Carlton-house-terrace, S.W.*
1863	Morrison, Colonel J. C. D. *Hillfoot-house, Dollar, Scotland.*
1867	Morrison, Pearson, Esq. *Bratton, Chittlehampton, N. Devon.*
1865	Morson, Thomas, Esq. 124, *Southampton-row, Russell-square, W.C.*
1873	1930 Mosenthal, Adolph, Esq. 18, *Aberdeen-park, Highbury, N.*
1869	Moser, Robert James, Esq. 45, *Bedford-square, W.C.*
1869	Mott, F. T., Esq. 1, *De Montfort-street, Leicester.*
1861	*Mouat, Frederick J., Esq., M.D., Surgeon-Major and Inspector-General of Prisons, Bengal Army, &c. 12, *Durham-villas, Kensington, W.; and Athenæum Club, S.W.*
1868	*Mounsey, Aug. Henry, Esq. *British Embassy, Vienna. Care of R. H. Mounsey, Esq., Castle-street, Carlisle.*
1871	*Mowatt, James, Esq., M.A. 51, *Notting-hill-square, W.; and Caius College, Cambridge.*
1871	*Mozley, H. W., Esq., M.A. *Eton College.*
1858	Mudie, Charles Edward, Esq. *Muswell-hill.*
1858	Mueller, Ferdinand, Esq., M.D., PH.DR. *Director of the Botanical Gardens, Melbourne. Care of Messrs. Dulau and Co.,* 37, *Soho-square, W.*
1874	*Muir, Hugh B., Esq. 34 *Clements-lane, Lombard-street, E.C.*
1867	1940 *Muir, Thomas, Esq. *Madeira; and* 24, *York-terrace, Regent's-park, N.W.*
1869	Müller, Albert, Esq. *Eaton-cottage, South Norwood, S.*
1873	Münster, His Excellency, Count. (Ambassador of the German Empire.) *German Embassy,* 9, *Carlton-house-terrace, S.W.*
1869	Munton, Francis Kerridge, Esq. 21, *Montagu-street, Russell-square, W.C.*
1866	*Murchison, John H., Esq. *Junior Carlton Club, S.W.*
1859	Murchison, Kenneth R., Esq. 24, *Chapel-street, Park-lane, W.; and Junior United Service Club.*
1830	*Murdoch, Sir Thomas W. Clinton, K.C.M.G. 8, *Park-street, Westminster, S.W.; and* 88, *St. George's-square, S.W.*
1860	Murray, George J., Esq. *Purbrook-house, Cosham, Hants; and Junior Carlton Club, S.W.*

Year of Election.

1872 *Murray, G. S. D., Esq. *New University Club, St. James's-street, S.W.*

1868 *Murray, Henry, Esq. *Garrick Club, Garrick-street, W.C.*

1844 1950 *Murray, James, Esq.

1830 Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.*

1872 *Murray, John, Esq., jun. *Newlands, Wimbledon, S.W.*

1870 Murray, T. Douglas, Esq. 34, *Portland-place, W.*

1860 *Murray, Lt. W., 68th Beng. N. Inf., Topo. Assist. G. Trig. Survey. *Mussoorie, India. Care of Messrs. H. S. King and Co.*

1870 Murray, William Vaughan, Esq., M.R.I., &c. 4, *Westbourne-crescent, Hyde-park, W.*

1865 Mussy, H. G. de, Esq., M.D.

1875 Naidu, P. Venkatakrishnama, Esq., Barrister-at-Law, High Court, Madras. *Care of Messrs. Binny and Co., Leadenhall-street.*

1865 Nairne, P. A., Esq. 2, *Grove-hill, Camberwell, S.E.*

1868 Napier, of Magdala, Lord, G.C.B., F.R.S.

1861 1960 Napier, William, Esq.

1870 Napier, Wm. Jno. Geo. (Master of Napier.) 1, *Queen-square, Westminster, S.W.; and Thirlestane-castle, Selkirkshire.*

1871 Nares, Captain G. S., R.N. *Care of the Hydrographer, Admiralty, S.W.*

1859 *Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. 5, *Charlotte-street, Edinburgh.*

1872 Nayler, Geo., Esq. (Surgeon). 3, *Savile-row, W.*

1875 Neal, Capt. William. *Army and Navy Club, Pall-mall.*

1873 Nelson, George Henry, Esq. 1, *Hillside, Wimbledon, S.W.*

1857 *Nesbitt, Henry, Esq. 12, *Victoria-villas, Kilburn, N.W.*

1875 Nesbitt, William, Esq. *Junior Carlton Club, Pall-mall, S.W.*

1869 Neville, Lieut.-Col. Edward. 30, *Clarges-street, Piccadilly, W.*

1870 1970 Newall, Wm. Johnstone, Esq. 33, *South-street, Park-lane, W.*

1868 Newbatt, Benjamin, Esq., F.S.S., &c. 7, *Vicarage-gardens, Campden-hill, W.*

1867 Newdigate, Lieut.-Col. Francis W. (Coldstream Guards). 26, *Seymour-street, W.; and Byrkley-lodge, Needwood Forest, Burton-upon-Trent.*

1836 Newman, Thomas Holdsworth, Esq. 9, *Gt. Cumberland-place, Hyde-park, W.*

1873 Newton, Alfred P., Esq. 15, *Sheffield-gardens, Campden-hill, W.*

1872 Newton, Wm., Esq. 11, *Mitre-court, Temple, E.C.*

1870 Nicholas, W., Esq. 2, *Shirley-villas, Prospect-hill, Walthamstow, E.*

1870 Nicholl, Henry John, Esq. 16, *Hyde-park-gate, W.*

1870 Nichols, James, Esq. 22. *Laurence Pountney-lane, E.C.; and The Mount, Kenley, Surrey.*

1865 *Nichols, Robert C., Esq. 5, *Sussex-place, W.*

Year of Election.	
1856	1980 Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 26, *Devonshire-place, Portland-place, W.*
1875	Nicholson, Robert, Esq. *Loan End-house, Norham, near Berwick-on-Tweed, Northumberland.*
1868	Nicol, Geo. Wm., Esq. *Care of Messrs. Glyn, Mills, & Co., 67, Lombard-st., E.C.*
1869	*Nicol, Robert, Esq. *Reform Club, S.W.; and Westminster-palace-hotel, S.W.*
1868	Nicol, Wm., Esq. 41, *Victoria-st., S.W.; and Fawsyde, Kenneff, Kincardine.*
1871	Nicols, Arthur Robert, Esq. 11, *Church-row, Hampstead, N.W.*
1836	*Nicolson, Vice-Admiral Sir Frederick Wm. Erskine, Bart., C.B. 15, *William-street, Lowndes-square, S.W.*
1873	Nimmo, Rev. R., B.A., R.N. *Mill-house, Grantchester, near Cambridge, and H.M.S. 'Bellerophon.'*
1864	Nissen, H. A., Esq. *Mark-lane, E.C.*
1858	Nix, John H., Esq. 77, *Lombard-street, E.C.*
1874	1990 *Noldwritt, Jno. Spencer, Esq. 352, *Albany-road, Camberwell, S.E.*
1857	*Nolloth, Admiral Matthew S. 13, *North-terrace, Camberwell, S.E.; and United Service Club, S.W.*
1865	*Norman, H. J., Esq. 4, *Halkin-street, Grosvenor-place, S.W.*
1872	Norris, Charles, Esq. 124, *Wood-street, E.C.; and Marischal-road, Lee, Kent.*
1860	Norris, Harry, Esq. *Colonial-office, S.W.; and 4, Little St. James's-street, S.W.*
1861	North, Alfred, Esq. 23, *Lansdowne-crescent, Notting-hill, W.*
1865	Northumberland, Algernon George, Duke of. 2, *Grosvenor-place, S.W.*
1875	Norton, Geo., Esq., M.A. 2, *Gloucester-place, Hyde-park, W.*
1862	Notman, Henry Wilkes, Esq. 7, *Great Marlborough-street, W.*
1862	Nourse, Henry, Esq. *Conservative Club, S.W.*

1858	2000 *Oakeley, R. Banner, Esq.
1858	Ogilvie, Edward D., Esq. *Yulgillar, Clarence-river, New South Wales. Care of Messrs. Marryat and Sons, Laurence Pountney-lane, E.C.*
1875	Ogilvie, Geo. M., Esq. 14, *St. James's-square, S.W.; and Raleigh Club, Regent-street, S.W.*
1863	Ogilvy, Col. Thos. 23, *Grafton-st., Piccadilly, W.; and Ruthven, Forfarshire, N.B.*
1873	Older, W. Aug., Esq. *Carrington-lodge, Richmond.*
1861	Oldershaw, Capt. Robert Piggott. 74, *Warwick-square, Belgrave-road, S.W.*
1872	Oldfield, Captain Rudolphus, R.N. *United Service Club, S.W.*
1870	Oldham, Henry, Esq., M.D. 26, *Finsbury-square, E.C.*
1855	Oliphant, Laurence, Esq. *Athenæum Club, S.W.*
1866	Oliver, Captain S. P., 12th Brigade R.A. *Care of Rev. W. Oliver, Bovinger-rectory, Ongar, Essex.*
1845	2010 *Ommanney, Admiral Erasmus, C.B., F.R.S., F.R.A.S. 6, *Talbot-square, Hyde-park, W.; and United Service Club, S.W.*

Year of Election.	
1838	*Ommanney, H. M., Esq. *Blackheath, S.E.*
1867	Ormathwaite, John Benn-Walsh, Lord. 28, *Berkeley-square, W.*
1873	*Ormerod, Henry Mere, Esq. *Broughton-park, Manchester.*
1873	Orpen, F. H. S., Esq. *Barkly, Griqualand West, South Africa.*
1853	Osborn, Sir George R., Bart. *Travellers' Club, S. W.; and Chicksand-priory, Beds.*
1861	*Osborne, Lieut.-Col. Willoughby. *Political Agent, Bhopal, Schira, India.*
1852	Oswell, William Cotton, Esq. *Groombridge, Kent.*
1860	*Ouvry-North, Rev. J. *East Acton, Middlesex, W.*
1875	Overall, Wm. Henry, Esq., F.S.A. *Guildhall, E.C.*
1870	2020*Overbeck, M. the Chev. G. de. *Hong-Kong. Care of Messrs. King and Co., 65, Cornhill, E.C.*
1875	Overbury, E. N., Esq. (Madras Civil Service). 14, *St. James's-square, S.W.*
1844	*Overstone, Samuel, Lord, M.A., K.R.I. 2, *Carlton-gardens, S.W.; and Wickham-park, Surrey.*
1873	Oxenham, Edward Lavington, Esq. *Nutcombe-house, Weybridge, Surrey.*
1868	Owden, Thomas S., Esq. *Mount-pleasant, Philip-lane, Tottenham.*
1874	Packe, William, Esq. 1, *Cavendish-square, S.W.*
1874	Padmore, Jas. Mitchell, Esq. *Bow-bridge-house, Leicester.*
1873	Page, George Gordon, Esq., C.E. 4, *Great James-street, Gray's-inn, W.C.*
1870	Palmer, F. J., Esq., R.N. 8, *Cullum-street, E.C.*
1865	*Palmer, Captain George, R.N. *H.M.S. 'Rosario,' Australia; and Cavers, Hawick, Roxburghshire, N.B.*
1870	2030*Palmer, John Linton, Esq., Surg. R.N. 24, *Rock-park, Rockferry, Cheshire.*
1872	Palmer, Joseph, Esq., B.A., &c. *Wells, Somerset.*
1862	Palmer, Rev. Jordan, M.A., F.S.A. *Oxford and Cambridge Club, Pall-mall, S.W.*
1873	Palmer, J. Horsley, Esq. 56, *Cromwell-road, Queen's-gate, S.W.*
1838	*Palmer, Samuel, Esq.
1869	*Palmer, T. G. A., Esq. 5, *Paper-buildings, Inner Temple, E.C.*
1870	Pannel, Charles S., Esq. *Walton-lodge, Torquay.*
1865	*Papengouth, Oswald C., Esq., C.E. *Care of W. Hornibrook, Esq.,* 6, *Regent's-square, W.C.*
1870	Parfitt, W. S., Esq., C.E. *Montevideo. Care of Mrs. Parfitt, Devizes, Wilts.*
1863	*Paris, H.R.H. le Comte de.
1864	2040Parish, Captain A. *Bembridge, Isle of Wight.*
1849	*Parish, Capt. John E., R.N. *Army and Navy Club, S.W. Care of Messrs. Stilwell, Arundel-street, Strand.*
1833	Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonards-on-Sea.*
1874	Park, Abraham, Esq. *Warrington-terrace, Ashton-under-Lyne; and Morningdale-house, Renfrewshire, N.B.*
1873	Park, James Dickson, Esq. 48, *Queen's-gate-gardens, South Kensington, W.*
1866	Parker, Capt. Francis G. S., 54th Regiment, F.G.S., A.I.C.E. *Morar, Gwalior.*

Year of Election.	
1873	Parker, James, Esq, 45, *Leinster-square, Hyde-park, W.*
1850	Parkes, Sir Harry S., K.C.B., &c.
1873	Parkin, George Lewis, Esq. 22, *Park-lane, W.*
1850	*Parkyns, Mansfield, Esq., F.Z.S. *Arthur's Club, St. James's-street, S.W.; and* 59, *Prince's-square, Bayswater, W.*
1872	2050 Parry, Edward, Esq. 284, *Camden-road, N.W.*
1872	*Parry, Francis, Esq. *Junior Athenæum Club; and* 102, *Piccadilly, W.*
1873	Pasco, Captain Crawford, R.N. *Care of Case and Loudensack,* 1, *James-street, Adelphi, W.; 'Proc.' to Capt. J. E. Davis,* R.N., *Hydrographic-office.*
1874	Pass, Elias de, Esq. 2, *Kensington-gardens-terrace, Hyde-park, W.; and The Lodge, Bembridge, Isle of Wight.*
1859	Pasteur, Marc Henry, Esq. 38, *Mincing-lane, E.C.*
1867	Paterson, John, Esq. 19A, *Coleman-street, E.C.*
1871	Patterson, Jas. Wilson, Esq. *Roseland, Waverley, Baltimore Co., U.S.A.*
1875	Patterson, Myles, Esq. 28, *Gloucester-place, Hyde-park, W.*
1863	Pattinson, J., Esq. 21, *Bread-street, E.C.*
1868	Paul, J. H., Esq., M.D. *Camberwell-house, Camberwell, S.E.*
1858	2060 Paul, Joseph, Esq. *Ormonde-house, Ryde, Isle of Wight.*
1874	Paulson, W. H., Esq., B.A.
1872	Paxton, Robert Chas., Esq. 24, *Stafford-terrace, Phillimore-gardens, W.*
1874	Payne, Wm., Esq. *The Keep, Forest Hill.*
1847	*Paynter, William, Esq., F.R.A.S. 21, *Belgrave-square, S.W.; and Camborne-house, Richmond, Surrey, S.W.*
1853	Peacock, George, Esq. *Starcross, near Exeter.*
1872	Pears, Rev. S. A., D.D., Head Master of Repton School. *Childrey-rectory, Wantage.*
1863	Pearse, Captain R. B., R.N. 9, *Hyde-park-street, W.*
1874	Pearson, Colonel Alfred. *United Service Club, S.W.*
1874	Pechey, J. T. Primrose, Esq. *Leytonstone, Essex.*
1853	2070 *Peckover, Alexander, Esq., F.L.S. *Wisbeach.*
1875	*Peek, Cuthbert E., Esq. *Wimbledon-house, Wimbledon, S.W.*
1860	*Peek, Sir Henry William, Bart., M.P. *Wimbledon, S.W.*
1872	*Peel, Captain Francis.
1858	Peel, Right Hon. Sir Robert, Bart., M.P. 4, *Whitehall-gardens, S.W.; and Drayton-manor, Tamworth.*
1874	*Pelham, Hon. Arthur L. *Stanmer, Lewes, Sussex.*
1871	Pembroke, George R. C. Herbert, Earl of. *Wilton-house, Salisbury; and* 10, *Victoria-square, Pimlico, S.W.*
1868	*Pender, John, Esq. 18, *Arlington-street, W.*
1875	Pender, Staff-Comm. D., R.N. *Admiralty, Whitehall; and Esquimalt, Thornton-hill, Wimbledon, S.W.*
1863	*Pennant, Colonel S. S. Douglas. *Penrhyn-castle, Bangor.*
1859	2080 *Penrhyn, Lord. *Penrhyn-castle, Bangor.*
1874	Pepys, Hon. Walter Courtenay. *Windham Club, St. James's-square, S.W.*

Year of Election.

1853 Percy, Lieut.-General the Hon. Lord Henry M. (Guards). 40, *Eaton-sq., S.W.*

1865 Pereira, Francisco E., Esq.

1860 Perkins, Sir Frederick, M.P. 71, *Russell-square, W.C.; and Southampton.*

1865 Perkins, William, Esq. *Rosario, Argentine Republic. Care of the Central Argentine Railway Co., Palmerston-buildings, Old Broad-street.*

1859 Perry, Sir Erskine, Member Indian Council. *36, *Eaton-place, S.W.*

1865 Perry, Gerald R., Esq. *British Consulate, Stockholm.*

1862 *Perry, William, Esq. 9, *Warwick-road, Upper Clapton, N.E.*

1862 Peter, John, Esq. *Conservative Club, S.W.*

1857 2090 *Peters, William, Esq.

1860 *Petherick, John, Esq. 12, *St. Luke's-road, Westbourne-park, W.*

1860 Petrie, Major Martin, 97th Regiment. *Hanover-lodge, Kensington-park, W.*

1871 Petter, G. Wm., Esq. *Streatham-grove, S.*

1866 Pharazyn, Robert, Esq. *Wellington, New Zealand. Care of Messrs. Scale and Rogers*, 36, *Mark-lane, E.C.*

1867 Phayre, Maj.-Gen. Sir Arthur, C.B., K.C.S.I. (Governor of Mauritius.) *Care of Messrs. H. S. King and Co.*, 45, *Pall-mall, S.W.; and E. India United Service Club, S.W.*

1854 Phelps, William, Esq. 18, *Montagu-place, Russell-square, W.C.*

1862 *Phené, John Samuel, Esq., LL.D., F.S.A., F.G.S. 5, *Carlton-terrace, Oakley-street, S.W.*

1873 *Philbrick, Frederick Adolphus, Esq. 28, *Avenue-road, N.W.*

1860 Philip, George, Esq. 32, *Fleet-street, E.C.*

1872 2100 Philipps, Herbert Rees, Esq. *India-office, S.W.*

1872 Philipps, Sutherland Rees, Esq., M.D. *Three Counties Asylum, Arlesey, Baldock.*

1857 Phillimore, R.-Admiral Augustus. *Shedfield, Fareham, Hants; and India United Service Club, S.W.*

1859 Phillimore, Charles Bagot, Esq. *Hurley Manor-house, Great Marlow; and India-office, S.W.*

1860 Phillimore, Capt. Wm. Brough (Grenadier Guards). 5, *John-st., Berkeley-sq., W.*

1854 Phillips, Major-General Sir B. Travell. *United Service Club, S.W.*

1869 Phillips, Edwd. Aug., Esq. *Brounswell-villa, East End, Finchley; and* 4, *Bond-court, Walbrook, E.C.*

1873 Phillips, Geo., Esq. *Care of Jno. Marsh, Esq.*, 29, *High-street, Maidstone.*

1873 Philp, Capt. Fras. Lamb (Royal Scots Greys). *Aldershot. Care of Cox & Co., Craig's-court; and Army and Navy Club, S.W.*

1871 Philpott, Edward P., Esq., M.D., LL.D. *Poole, Dorsetshire.*

1872 2110 *Pickering, John, Esq. 28, *Springfield-mount, Leeds.*

1871 Pickersgill, Wm. Cunliffe, Esq. 58, *Prince's-gate, S.W.*

1871 Pierce, Josiah, Esq. 12, *Beaufort-gardens, Brompton-road, S.W.*

1870 Pigott, Robt. Turtle, Esq. *Manor-park, Lee, Kent; and* 36, *Southampton-street, Strand, W.C.*

1874 Pigott, Thomas Digby, Esq. *War-office, Pall-mall, S.W.*

1864 *Pigou, F. A. P., Esq. *Dartford, Kent.*

Year of Election.	
1852	*Pike, Captain John W., R.N. *United Service Club, S.W.*
1855	Pilkington, James, Esq. *Blackburn.*
1865	Pilkington, William, Esq. *War-office.*
1852	*Pim, Captain Bedford C. T., R.N., M.P. *Leaside, Kingswood-road, Upper Norwood, S.E.; 2, Crown-office-row, Temple, E.C.; and Senior and Junior United Service Club, S.W.*
1870	2120 Pimblett, James, Esq. *Tatenhill, Burton-on-Trent.*
1859	Pinney, Colonel William. 30, *Berkeley-square, W.*
1867	*Plant, Nathaniel, Esq. *Hotel Exchange, Rio de Janeiro; and De Montfort-house, Leicester.*
1871	Platt, Lieut.-Colonel Chas. Rowley. 4, *Bolton-street, Piccadilly, W.*
1872	Plaister, W. H., Esq., M.R.C.S., &c. *Tottenham, Middlesex.*
1865	Player, John, Esq. 22, *Carpenter-road, Edgbaston, Birmingham.*
1860	Playfair, Lieut.-Col. Robert Lambert. H.B.M. Consul-General, Algiers. *Care of Messrs. H. S. King and Co., 45, Pall-mall, S.W.*
1866	Plowden, Charles C., Esq. *The Cottage, Chislehurst, Kent.*
1856	*Plowes, John Henry, Esq. 39, *York-terrace, Regent's-park, N.W.*
1870	Plunkett, Major-Gen. the Hon. Charles Dawson. *United Service Club, S.W.*
1873	2130 Pollard, Henry Thos., Esq. 4 *Threadneedle-street, E.C.*
1855	*Pollexfen, Captain J. J. *India.*
1866	*Pollington, John Horace, Viscount. 8, *John-street, Berkeley-square, W.*
1835	*Ponsonby, The Hon. Frederick G. B. 3, *Mount-street, Grosvenor-square, W.*
1860	Pook, Captain John. 6, *Colfe's-villas, Lewisham-hill, S.E.*
1870	Poole, C. M., Esq., C.E. 97, *Talbot-road, Westbourne-park, W.*
1857	Pope, Captain Wm. Agnew. 18, *Portland-place, W.*
1863	*Porcher, Captain Edwin A., R.N. 60, *Chester-square, S.W.*
1874	*Porges, Theodore, Esq. 43, *St. James's-place, S.W.; and Austin Friars, E.C.*
1871	*Portal, Wm. Richd., Esq., M.A. *Tonge-house, Lower Norwood, S.*
1868	2140 Potter, Archibald Gilchrist, Esq. *Woodham-lodge, Lavender-hill, Wandsworth, S.W.*
1874	Potter, Richard, Esq. *Standish-house, Stonehouse, Gloucestershire.*
1867	Potter, Wm. H., Esq. *Care of G. T. White, Esq., Kinrara, Tooting-common.*
1861	*Pounden Captain Lonsdale. *Junior United Service Club, S.W.; and Brownswood, Co. Wexford.*
1862	Povah, Rev. John V., M.A. 11, *Endsleigh-street, W.C.*
1864	*Powell, F. S., Esq. 1, *Cambridge-square, Hyde-park, W.*
1874	Power, Edward, Esq. 45, *Belsize-park, Hampstead.*
1859	Power, E. Rawdon, Esq. (Retired List, Ceylon Civil Service). *Heywood-lodge, Tenby, South Wales; and Thatched-house Club, S.W.*
1868	Pownall, John Fish, Esq. 63, *Russell-square, W.C.*
1864	Powys, The Hon. C. J. F.
1864	2150 Powys, The Hon. Leopold.
1870	*Prance, Reginald H., Esq. *Frognal, Hampstead.*
1873	Preedy, Colonel H. William.

Year of Election.

1873 Prentice, Edward, Esq. *Care of Rev. H. Waller, The Rectory, Twywell-by-Thrapston, Northamptonshire.*

1873 *Prevost, Admiral J. C. 1, *Burton-street, Eaton-square, S.W.*

1868 Price, Charles S., Esq. *Bryn Derwen, Neath.*

1869 Price, F. G. H., Esq. 1, *Fleet-street, E.C.*

1873 Price, J. M., Esq., C.E.

1869 Price, James, Esq. 5, *Bina-gardens, South Kensington, S.W.*

1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*

1860 2160 *Prickett, Rev. Thomas William, M.A., F.S.A. 11, *Lypiatt-terrace, Cheltenham; and United University Club, Pall-mall East, S.W.*

1868 Prideaux, Capt. W. F., Bombay Staff Corps. *Care of Messrs. King and Co.* 45, *Pall-mall, S.W.*

1873 Prince, John Sampson, Esq. 34, *Craven-hill-gardens, Hyde-park, W.*

1865 *Pringle, A. Esq. *Yair, Selkirk, N.B.*

1855 *Pringle, Thomas Young, Esq. *Reform Club, S.W.*

1866 *Prinsep, Edw. Aug., Esq., B.C.S., Commissioner of Settlements in the Punjaub, *Umritsur. Care of Messrs. H. S. King and Co.*, 65, *Cornhill, E.C.*

1868 Pritchard, Lieut.-Col Gordon Douglas. *Bengal.*

1874 Probyn, Maj.-General Deighton, V.C., C.B. 35, *Cadogan-place, W.*

1874 Procter, Jno., Esq. *Cromwell-house, Long Preston, Leeds; and* 2, *Crown-office-row, Temple, E.C.*

1872 Proctor, Samuel, Esq. (Head Master, Borough Schools, San Fernando, Trinidad). *Care of E. H. Penney, Esq.*, 17, *Lime-street, E.C.*

1861 2170 *Prodgers, Edwin, Esq. *The Rectory, Ayott St. Peter's, Herts.*

1874 Protheroe, Capt. Montague. *Care of Messrs. Grindlay and Co.*, 55 *Parliament-street, W.; and Junior United Service Club, S.W.*

1874 Protheroe, Pryse, Esq. *Gothic-cottage, Adelaide-road, Surbiton.*

1852 Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club, S.W.; and Neasdon, Middlesex, N.W.*

1861 Pryce-Jones, John, Esq. *Grove-park School, Wrexham.*

1874 Pryor, Rev. Jno. Eade. *Bennington-rectory, Stevenage, Herts.*

1862 *Puget, Lieut.-Colonel J., 8th Hussars. 5, *Hyde-park-terr., S. Kensington, S.W.*

1872 Puleston, John H., Esq. 2, *Palace-gate, Kensington, W.*

1860 Puller, Arthur Giles, Esq. *Athenæum Club, S.W.; Arthur's Club, S.W.; and Youngsbury, Ware.*

1872 Punsfer, Wm. B., Esq. 1 *and* 2, *Grosvenor-villas, Merton-road, Wandsworth, S.W.*

1857 2180 Purcell, Edward, Esq., LL.D. *Whitchurch, Monmouth.*

1869 Purdon, Lieut. George Frederic, R.N.

1865 *Pusey, Sidney E. Bouverie, Esq.

1870 Pycroft, Sir Thomas, K.C.S.I. 17, *Cleveland-gardens, Hyde-park, W.*

1861 Quin, Lord George. 15, *Belgrave-square, S.W.*

Year of Election.

1868 Quin, John Thomas, Esq. *Care of Mr. Lambson, Collegiate School, Weymouth.*

1862 Quin, T. Francis, Esq. *Whitelands, High-street, Clapham, S.W.*

1871 Radcliffe, Sir Joseph P., Bart. *Caverswall-castle, Cheadle, Staffordshire.*

1858 *Radstock, Granville Augustus, Lord. 30, *Bryanston-square, W.*

1869 Rae, Edward, Esq. *Devonshire-road, Birkenhead.*

1862 2190 *Rae, James, Esq. 32, *Phillimore-gardens, Kensington, W.*

1853 Rae, John, Esq., M.D., LL.D. 2, *Addison-gardens-south, Holland-villas-road, Kensington, W.*

1870 Raikes, Francis Wm., Esq. *Junior Carlton Club.*

1867 Raleigh, Rev. A., D.D. *Arran-house, Highbury-new-park.*

1871 Ralli, Eustratius, Esq. 93, *Lancaster-gate, W.*

1871 Ralli, Pandeli, Esq. 17, *Belgrave-square, S.W.*

1870 Ralston, W. R. Shedden, Esq., M.A. *British Museum, W.C.*

1873 Rambaut, John, Esq., M.D. *The Grange, Godstone, Surrey.*

1866 Ramsay, Alex., Esq. *Kilmorey-lodge, Castlebar, Ealing, W.*

1873 Ramsay, F. W. Hutchinson, Esq., M.D. 15, *Somerset-street, Portman-square, W.*

1867 2200 Ramsay, John, Esq. *Islay, N.B.*

1867 *Ramsden, Richard, Esq., B.A. *Camp-hill, Nuneaton, Warwickshire.*

1869 Randell, Thomas, Esq. *Castle-green, Taunton.*

1874 Rankin, Capt. Fras. W. *Northwick-villa, Clifton, Gloucestershire; and Junior Naval and Military Club, Piccadilly.*

1868 Rankin, William, Esq. *Tiernaleague, Carndonagh, Donegal.*

1866 *Ransom, Edwin, Esq. *Kempstone, near Bedford.*

1869 Rassam, Hormuzd, Esq., Assistant Political Resident, Aden. *Ailsa-park-lodge, Twickenham, S.W.*

1859 Ratcliff, Colonel Charles, F.S.A. *Athenæum Club, S.W.; Edgbaston, Birmingham; and Downing College, Cambridge.*

1870 Ratcliffe, Rev. Thomas, B.D., &c.

1861 Rate, Lachlan Macintosh, Esq. 9, *South Audley-street, W.*

1873 2210 Ravenscroft, W. H., Esq. 19, *Lansdowne-road, W.*

1846 Ravenshaw, E. C., Esq., M.R.A.S. *Oriental Club, W.; and 36, Eaton-sq., W.*

1859 Ravenstein, Ernest G., Esq. *Alpha-cottage, Lorn-road, Brixton, S.W.*

1875 Rawlings, H. D., Esq. *Chalk-hill, Kingsbury, N.W.*

1861 Rawlinson, Sir Christopher. 38, *Queen Anne's-gate, St. James's-park, S.W.*

1844 *Rawlinson, Major-General Sir Henry C., K.C.B., D.C.L., LL.D., F.R.S. *Athenæum Club, S.W.; and 21, Charles-street, Berkeley-square, W.*

1874 Rawson, Christopher, Esq. 8, *Sussex-place, Cornwall-road, S.W.*

1838 Rawson, His Excellency Rawson Wm., C.B., Governor-in-Chief of the Windward Islands. *Barbadoes.*

1875 Rawson, Lieut. Wyatt, R.N. 8, *Sussex-place, W.*

Year of Election.	
1869	Ray, Captain Alfred William. *The Lodge, Brixton-oval, S.W.*
1872	2220 Ray, George H., Esq., M.D., Bengal.
1874	*Rayleigh, Lord. *Terling-place, Witham, Essex.*
1873	Read, Frederick, Esq. 45, *Leinster-square, W.*
1874	Read, F. W. C., Esq. *Walthamstow, E.*
1865	Redhead, R. Milne, Esq. *Springfield, Seedley, Manchester; Conservative Club, S.W.; and Junior Carlton Club, S.W.*
1868	*Redman, John B., Esq., C.E. 6, *Westminster-chambers, Victoria-street, S.W.*
1871	Reed, Andrew Holmes, Esq. *Earlsmead, Page-green, N.*
1859	Reeve, John, Esq. *Conservative Club, S.W.*
1866	*Rehden, George, Esq. 2, *Great Tower-street, E.C.*
1861	*Reid, David, Esq. 95, *Piccadilly, W.*
1857	2230 Reid, Lestock R., Esq. *Athenæum Club, S.W.; and* 122, *Westbourne-terrace, W.*
1871	*Reid, Robert, Esq., B.A., F.Z.S. *Iffley, Oxford.*
1861	Reilly, Anthony Adams, Esq. *Belmont, Mullingar.*
1869	*Reiss, James, Esq. 7, *Cromwell-road-houses, South Kensington, W.*
1872	Remfry, Jno., Esq. *The Grange, Nightingale-lane, Clapham-common, S.W.*
1866	*Rennie, John Keith, Esq., M.A., Camb. 2, *Eccleston-square, S.W.*
1834	*Rennie, M. B., Esq., C.E. *Care of James Rennie, Esq.,* 9, *Motcomb-street, Belgrave-square, S.W.*
1864	Rennie, W., Esq. 6, *Great Cumberland-place, W.*
1830	*Renwick, Lieutenant, R.E.
1861	Reuter, Julius, Baron de. *Kensington-palace-gardens, W.*
1858	2240 Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.*
1874	Reynolds, James, Esq. 174, *Strand, W.C.*
1872	Reynolds, Wm. Hy., Esq. *Care of Messrs. King & Co.,* 65, *Cornhill, E.C.*
1867	Rhodes, Arthur John, Esq. *York-villa, London-road, St. Albans.*
1874	Rhodes, Hon. Wm. Barnard, Mem. Legis. Council, New Zealand. *Wellington, New Zealand; care of Messrs. Jas. Morrison and Co.,* 4, *Fenchurch-street, E.C.*
1870	Rice, Joseph Marcus, Esq., M.D. 17, *Pleasant-street, Worcester City, Mass., U.S. Care of Messrs. Haseltine, Lake, and Co.,* 8, *Southampton-buildings, W.C.*
1870	Rice, Wm., Esq. 20, *Elm-grove, Brixton-hill, S.W.; and Stanford's Geograph. Establishment, Charing-cross, S.W.*
1868	Richards, Alfred, Esq. *Tewkesbury-lodge, Forest-hill.*
1874	Richards, Capt. F. W., R.N. *United Service Club; and H.M.S. 'Devastation,' Channel Squadron.*
1860	Richards, Rev. George, D.D. *Pelham-vicarage, Buntingford.*
1857	2250 Richards, Admiral George H., F.R.S., C.B. 24, *Warrington-crescent, Maida-vale, W.*
1874	*Richards, M. W. Esq. *Shore-road, S. Hackney, E.*
1864	Richardson, F., Esq. *Juniper-hall, Mickleham, Dorking.*
1873	Richardson, W. Brown, Esq. *Darlaston-rectory, Wednesbury, Staffordshire.*

Year of Election	
1863	*Rickard, Major F. J. 10A *Pall-mall East, S.W.*
1859	Rickards, Edward Henry, Esq. 4, *Connaught-place, Hyde-park, W.*
1873	Riddell, Lieut. H. S. Hutton. *Halifax, Nova Scotia. Care of C. J. Ridge, Esq., Newark-upon-Trent, Nottinghamshire.*
1865	*Rideout, W. J., Esq. 51, *Charles-street, Berkeley-square, W.*
1864	Ridley, F. H., Esq. 44, *Alexandra-road, St. John's-wood, N.W.*
1864	Ridley, George, Esq. 2, *Charles-street, Berkeley-square, W.*
1874	2260 Ridpath, James Lionel, Esq. *Devon-lawn, Wimbledon-park.*
1875	Ridpath, Thomas Alex., Esq. 33, *George-street, Hanover-square, W.*
1862	*Rigby, Major-General Christopher Palmer. *Oriental Club, W.; and* 14, *Mansfield-street, W.*
1868	Riley, Captain Charles Henry. *Junior United Service Club, S.W.*
1860	Rintoul, Robert, Esq. *Windham Club, S.W.*
1853	Ripon, Geo. Fredk. Sam., Marquis of, F.R.S. 1, *Carlton-gardens, S.W.; and Studley Royal, Ripon.*
1874	Ritchie, Rev. George St. Martin (Chaplain to the Forces). *Aldershot.*
1868	*Roberts, Charles W., Esq. *Penrith-house, Effra-road, Brixton, S.W.*
1861	Roberts, Capt. E. Wynne. *Nutfield-lodge, Pouchen-end, Boxmoor, Herts; and Junior Carlton Club, S.W.*
1874	Robertson, A. D., Esq. 53, *Queen's-gate, W.*
1865	2270 Robertson, A. Stuart, Esq., M.D. *Horwich, near Bolton.*
1860	Robertson, D. Brooke, Esq., H.B.M.'s Consul. *Canton. Care of Messrs. H. S. King and Co.*
1875	Robertson, D. I. U., Esq. 174, *Chatham-street, Falkner-square, Liverpool.*
1861	*Robertson, Graham Moore, Esq. 21, *Cleveland-square, Hyde-park, W.*
1870	*Robertson, James Nisbet, Esq. 23, *Porchester-square.*
1868	Robertson, Rev. J. S. S., M.A., F.R.A.S. *Duncrub-castle, Duncrub-park, Dunning, Perthshire, N.B.*
1863	Robertson, R. B., Esq. *H.M.'s Legation, Yokohama, Japan.*
1873	Robertson, Major Wheatley. 35, *Queen's-gardens, W.*
1870	Robinson, Alfred, Esq. *Mountjoy-house, Huddersfield.*
1875	*Robinson, Arthur M., Esq. 32, *Devonshire-road, Claughton, Birkenhead.*
1830	2280 *Robinson, Vice-Admiral Charles G. 30, *Blomfield-terr., Westbourne-terr., W.*
1873	Robinson, Capt. F. C. B., R.N. *Junior United Service Club, S.W.*
1872	Robinson, Henry, Esq., M.I.C.E., F.G.S. 7, *Westminster-chambers, S.W.*
1871	Robinson, Rev. Henry Mowld, M.A. *Chigwell, Essex.*
1864	Robinson, H. O., Esq. 6, *South-street, Finsbury, E.C.*
1859	Robinson, Sir Hercules G. R., K.C.M.G. (Governor of New South Wales.) *Messrs. Burnett,* 17, *Surrey-street, W.C.*
1865	Robinson, J. R., Esq., LL.D., F.S.A. Scot., LL.D., F.R.S.A. du Nord, Copenhagen, F.G.S. Edin., Membre Société Asiatique de Paris, &c. *South-terrace, Dewsbury.*
1864	Robinson, John, Esq. *Care of E. Street, Esq.,* 30, *Cornhill, E.C.*
1874	Robinson, John, Esq., C.E. 2, *Westminster-chambers, S.W.*

Year of Election.	
1862	Robinson, Colonel Sir John Stephen, Bart. *Arthur's Club, S.W.; and 20, Park-lane, W.*
1860	2290 Robinson, Mr. Serjeant. 8, *King's-Bench-walk, Temple, E.C.; and 43, Mecklenburgh-square, W.C.*
1855	Robinson, Thomas F., Esq., F.L.S. *Belmont-lodge, Anerley, S.E.*
1850	*Robinson, Captain Walter F., R.N. 15, *Montpellier-villas, Brighton.*
1872	Robinson, Wm., Esq. *Colonial-office, S.W.*
1870	Robinson, Hon. W. C. F., Governor of Western Australia. *Care of the Colonial-office.*
1830	*Rodd, James Rennell, Esq. 29, *Beaufort-gardens, S.W.*
1860	Roe, Capt. Jno. Septimus, Surveyor-General, W. Australia. *Care of Mrs. Ellis Jervoise, 7, Euston-place, Leamington.*
1873	Rogers, Major Brudenell. *Care of Messrs. Richardson and Co., 13, Pall-mall, S.W.*
1874	Rogers, Captain Ebenezer. *S.O.P., Chester.*
1863	Rogers, John T., Esq. *River-hill, Sevenoaks.*
1874	2300 Rogerson, Geo. Russell, Esq., F.R.A.S. *Waterloo-cottage, near Liverpool.*
1872	Rolleston, W. Vilett, Esq.
1861	Rollo, Lord. *Dumcrieff-castle, Moffat, N.B.*
1863	Rönn, M. Hermann von. *Ladbroke-lodge, Ladbroke-square, W.*
1866	Rooke, Major W., R.A. *Formosa, Lymington, Hants.*
1871	Rooks, Geo. Arthur, Esq. 24, *Lincoln's-inn-fields, W.C.*
1873	Rosa, Dr. Don Manuel Gonzalez de la, M.A.E. (Professor of Philosophy, University of San Marcos, Lima.) 80, *Guildford-street, Russell-sq., W.C.*
1872	Rose, H. Cooper, Esq., M.D. *Hampstead, N.W.*
1868	Rose, Henry, Esq. 8, *Porchester-square, Hyde-park, N.W.*
1861	Rose, Jas. Anderson, Esq. *Wandsworth, Surrey, S.W.; and 11, Salisbury-st., W.C.*
1870	2310 Rose, The Right Hon. Sir John. 18, *Queen's-gate, Hyde-park, W.*
1857	*Rose, Colonel Sir Wm. Anderson, Alderman, F.R.S.L. *Carlton Club, S.W.; 63, Upper Thames-street, E.C.; and Upper Tooting, S.W.*
1870	Ross, Capt. Geo. Ernest Augustus (King's Own Light Inf. Militia). *Forfar-house, Cromwell-road, South Kensington, W.*
1864	*Roundell, C. S., Esq. 63, *Cromwell-road, South Kensington, S.W.*
1862	Roupell, Robert Priolo, Esq., M.A., Q.C. J 5, *Albany, W.*
1839	*Rous, Vice-Admiral the Hon. Henry John. 13, *Berkeley-square, W.*
1864	*Routh, E. J., Esq., M.A., F.R.S., F.R.A.S., &c. *St. Peter's College, Cambridge.*
1874	Routledge, Edmund, Esq. 40, *Clanricarde-gardens, Bayswater, W.*
1872	*Row, A. V. Nursing, Esq. *Daba-garden, Vizagapatam, India. Care of King and Co., 65, Cornhill, E.C.*
1874	Rowan, Maj.-General H. S., C.B. *United Service Club, Pall-mall, S.W.*
1868	2320 *Rowlands, Percy J., Esq. *India-office, S.W.*
1863	Rowley, Captain C., R.N. 33, *Cadogan-place, S.W.*
1856	Rucker, J. Anthony, Esq. *Blackheath, S.E.*
1874	Rumbold, Capt. H. F. W. *Junior United Service Club, S.W.*

Year of Election.

1861 *Rumbold, Charles James Augustus, Esq. 5, *Percival-terrace, Brighton.*

1861 Rumbold, Thomas Henry, Esq. 38, *Sussex-square, Brighton.*

1860 Rumley, Major-General Randall, Vice-President Council of Military Education. 16, *Eaton-terrace, Eaton-square, S.W.*

1874 *Rusden, Geo. W., Esq. *Care of Messrs. Ashton and Co., Hatton-court, Threadneedle-street, E.C.*

1858 *Russell, Lord Arthur, M.P. 10, *South Audley-street, W.*

1869 Russell, George, Esq., M.A. *Viewfield, Southfields, Wandsworth; and* 16, *Old Change, St. Paul's, E.C.*

1875 2330 Russell, James H., Esq. *St. Mary's National Schools,* 4, *Kinglake-street, Edge-hill, Liverpool.*

1830 *Russell, Jesse Watts, Esq., D.C.L., F.R.S.

1830 Russell, John, Earl, F.R.S. 37, *Chesham-place, S.W.; Pembroke-lodge, Richmond, S.W.; Endsleigh-house, Devonshire; and Gart-house, near Callander, N.B.*

1875 Russell, Peter N., Esq. 66, *Queensborough-terrace, Hyde-park, W.*

1875 *Russell, Robert, Esq. 42, *Albemarle-street, W.*

1875 Russell, Thomas, Esq. 12, *Leinster-gardens, Hyde-park, W.*

1860 Russell, Wm. Howard, Esq., LL.D. *Carlton Club, S.W.*

1860 Rutherford, John, Esq. 2, *Cavendish-place, Cavendish-square, W.*

1873 Ruxton, Captain W. Fitzherbert, R.N. 41, *Cornwall-gardens, S.W.*

1857 *Ryder, Admiral Alfred P. *U.S. Club, S.W.; and Launde-abbey, Uppingham.*

1864 2340 Ryder, G., Esq. 10, *King's-Bench-walk, Temple, E.C.*

1868 Sabben, J. T., Esq., M.D. *Northumberland-house, Stoke Newington, N.*

1873 Sabel, Ernest E., Esq. 30, *Clarendon-gardens, Maida-hill, W.*

1852 Sabine, Lieut.-General Sir Edw., K.C.B., R.A., Pres. R.S., F.R.A.S., &c. &c. 13, *Ashley-place, Victoria-street, Westminster, S.W.; and Woolwich, S.E.*

1875 Sadgrove, Arthur William, Esq. 64, *Mark-lane, E.C.; and Eltham, Kent.*

1874 St. Albans, Duke of. 4, *Prince's-gate, S.W.; and Bestwood-park, Notts.*

1869 St. Clair, Alexander Bower, Esq., H.B.M. Consul. *Jassy, Moldavia.*

1873 St. Clair, John, Esq. *Newton Stewart, Wigtonshire.*

1857 St. David's, Right Rev. Connop Thirlwall, Bp. of. *Abergwilly-palace, Carmarthen.*

1874 St. Jean, Le Vicomte Ernest de Satgé. *Malvern Wells; and Junior Athenæum Club.*

1867 2350 St. John, Major Oliver Beauchamp Coventry, R.E. *Care of Messrs. H. S. King & Co.,* 65, *Cornhill, E.C.*

1862 St. John, Spenser, Esq., British Legation, Port-au-Prince, Haiti. *Care of J. A. St. John, Esq.,* 44, *St. John's-wood-terrace, St. John's-wood, N.W.*

1863 Sale, Lieut. M. T., R.E.

1867 Salkeld, Colonel J. C., H.M.I. Forces. 29, *St. James's-street, S.W.*

1868 Salles, J. de, Esq. 56, *Stanhope-gardens, South Kensington, W.*

1873 Salmon, Charles Spencer, Esq.

Year of Election.	
1869	*Salmond, Robert, Esq. *Reform Club, S.W.; 14, Woodside-crescent, Glasgow; and Rankinston, Patna, Ayr.*
1863	*Salt, Henry, Esq. *Egremont, Bournemouth.*
1875	Salthouse, Rev. Robert. *St. James's-parsonage, West Derby.*
1861	Salting, William Severin, Esq. *6, Grosvenor-gardens, S.W.*
1861	2360*Sandbach, Wm. Robertson, Esq. *10, Prince's-gate, Hyde-park, S.W.*
1867	Sandeman, David George, Esq. *Cambridge-house, Piccadilly, W.*
1874	Sanderson, Rev. Edward. *59, Conduit-street, W.*
1872	Sandhurst, General Lord, G.C.B., G.C.S.I. *Royal-hospital, Kilmainham, Dublin.*
1862	Sanford, Major Henry Ayshford. *29, Chester-street, Grosvenor-place, S.W.; and Nynehead-court, Wellington, Somerset.*
1870	Sanford, W. Ayshford, Esq., F.R.S. *Nynehead-court, Wellington, Somerset.*
1860	Sarel, Lieut.-Colonel H. A., 17th Lancers. *Shanghae.*
1869	Sarll, John, Esq. *Beauvoir-house, Hollington-park, St. Leonard's-on-Sea.*
1860	2370Sartoris, Alfred, Esq. *Abbottswood, Stow-on-the-Wold.*
1852	Saumarez, Captain Thomas, R.N., C.B. *The Firs, Jersey.*
1874	Saunders, Fras., Esq. *6, Limes-grove, Lewisham, S.E.*
1874	Saunders, Howard, Esq. *7, Radnor-place, Gloucester-square, W.*
1866	Saunders, James Ebenezer, Esq., F.L.S., F.G.S., F.R.A.S. *9, Finsbury-circus; and Granville-park, Blackheath, S.E.*
1864	Saurin, Admiral E. *Prince's-gate, S.W.*
1863	Sawyer, Col. Charles, 6th Dragoon Guards. *25, Queen's-gate-terrace, South Kensington, W.*
1875	*Schäfer, Wm. Fredk., Esq. *Lydstep-house, Highgate, N.*
1874	Schalch, Vernon Rodolph, Esq. *20, Milton-street, Dorset-square, N.W.*
1861	Schenley, Edward W. H., Esq. *14, Prince's-gate, S.W.*
1874	Scholfield, William F., Esq. *55, Onslow-gardens, S.W.*
1870	Scobell, Sandford Geo. T., Esq. *Down-house, Red Marley, Gloucester.*
1872	2380Scott, Abraham, Esq. *12, Farquhar-road, Upper Norwood, S.E.*
1866	Scott, Adam, Esq. *8, Warwick-road-west, Maida-vale, W.*
1875	Scott, Albert Edward, Esq. *Bishopsdown-grove, Tunbridge Wells.*
1866	Scott, Arthur, Esq. *Rotherfield-park, Alton, Hants; Travellers' Club, S.W.*
1873	*Scott, Dugald, Esq. *The Moorlands, Kersal-edge, Manchester.*
1859	Scott, Lord Henry. *3, Tilney-street, Park-lane, W.*
1861	*Scott, Hercules, Esq. *Brotherton, near Montrose, N.B.*
1868	Scott, William Cumin, Esq. *Mayfield-house, Blackheath-park, S.E.*
1863	Scovell, George, Esq. *34, Grosvenor-place, S.W.*
1873	Searight, Hugh Ford, Esq. *7, East India-avenue, E.C.*
1861	2390Searight, James, Esq. *80, Lancaster-gate, W.*
1867	Seaton, Colonel the Right Hon. Lord. *D 3, Albany, W.*
1869	Sedgwick, Jno. Bell, Esq. *1, St. Andrew's-place, Regent's-park, N.W.*
1858	*Serocold, Charles P., Esq. *Brewery, Liquorpond-street, E.C.*

Year of Election.

1853 Sevin, Charles, Esq. 155, *Fenchurch-street, E.C.*

1872 Sewell, Stephen A., Esq. *Reigate, Surrey.*

1867 Seymour, Alfred, Esq., M.P. 47, *Eaton-square, S.W.*

1872 *Seymour, Admiral F. Beauchamp, C.B. *Admiralty, Whitehall, S.W.*

1874 Seymour-Fitzgerald, Gerald V., Esq. *India-office, S.W.*

1858 Seymour, George, Esq. 54, *Lime-street, E.C.*

1853 2400 *Seymour, Henry Danby, Esq. *Athenæum Club, S.W.; Knoyle-house, Hindon, Wilts.*

1873 *Seymour, Colonel W. H., C.B. *United Service Club, Pall-mall, S.W.*

1854 *Shadwell, Admiral Sir Charles F. A., K.C.B., F.R.S. *Meadow-bank, Melksham, Wilts.*

1860 *Shadwell, Lieut.-Colonel Lawrence.

1874 Shanks, Capt. Joseph G., R.M.L.I. *Plymouth, Devon.*

1856 *Share, Staff-Commander James Masters, R.N. *Hornbrook-house, Compton, Plymouth.*

1873 *Sharp, Colin Kimber, Esq. 43, *Tregunter-road, West Brompton, S.W.*

1873 Sharp, Captain Cyril. 7, *Thurloe-square, S.W.*

1866 Sharp, Henry T., Esq. 102, *Piccadilly, W.*

1861 *Sharpe, William John, Esq. 1, *Victoria-street, Westminster, S.W.; and Norwood, Surrey, S.E.*

1869 2410 Shaw, James V., Esq. *The Elms, Twickenham, S.W.*

1874 Shaw, C. Bousfield, Esq. 26, *Charles-street, St. James's; and 2, Essex-court, Temple.*

1862 *Shaw, John, Esq. *Finegand, Otago, New Zealand. Care of John Morrison, Esq., New Zealand Government Agency, 7, Westminster-chambers, Victoria-street, S.W.*

1861 Shaw, John Ralph, Esq. *Arrowe-park, Birkenhead.*

1870 *Shaw, Robert B., Esq. (British Joint Commissioner) *Ladak, Punjab, East Indies. Care of General Younghusband,* 106, *Pembroke-road, Clifton.*

1870 *Shearme, Edward, Esq. *Junior Athenæum Club, W.*

1846 Sheffield, George A. F. C., Earl of, F.R.S. 20, *Portland-place, W.; and Sheffield-park, Sussex.*

1868 *Shelley, Captain G. Ernest. 32, *Chesham-place, W.*

1867 Shenstone, Fredk. Smith, Esq. *Sutton-hall, Barcombe, Lewes.*

1867 Shepherd, Chas. Wm., Esq., M.A., F.Z.S. *Trottersclifle, Maidstone.*

1860 2420 Sheridan, H. Brinsley, Esq. *New City Club, E.C.*

1863 Sheridan, Richard B., Esq., M.P. 48, *Grosvenor-place, W.*

1857 Sherrin, Joseph Samuel, Esq., LL.D., PH.DR. *Leyton-house, Leyton-crescent, Kentish-town, N.W.*

1859 *Sherwill, Lieut.-Col. W. S., F.G.S. *Perth, N.B.*

1858 *Shipley, Conway M., Esq. *Twyford-moors, Winchester.*

1868 Shirley, Lionel H., Esq., C.E., &c. *Windham Club, S.W.; and* 9, *Queen's-gate-terrace, S.W.*

1871 *Shoolbred, James, Esq. 38, *Lancaster-gate, Hyde-park, W.*

Year of Election.	
1873	Short, Robert, Esq. 42, *Hillmarten-road, Camden-road, N.*
1872	*Shuter, William, Esq. 66, *Belsize-park-gardens, Haverstock-hill, N.W.*
1856	Shuttleworth, Sir J. P. Kay, Bart. 3, *Victoria-street, S.W.; and Gawthorp-hall, Burnley, Lancashire.*
1869	2430 Silk, George Chas., Esq. *The Vicarage, Kensington, W.*
1871	*Sills, Wm. Bernard, Esq. 19, *Beaufort-gardens, S.W.*
1870	Silva, Emanuel, Esq. 8, *Sheen-villas, Park-road, Richmond, S.W.*
1865	*Silva, Frederic, Esq. 12, *Cleveland-square, Bayswater, W.*
1859	Silver, the Rev. Fred., M.A., F.R.A.S., F.G.S., F.L.S. *Rectory, Norton-in-Hales, Market Drayton, Salop.*
1859	*Silver, Stephen Wm., Esq. 66, *Cornhill, E.C.; and 3, York-gate, Regent's-park, N.W.*
1860	Sim, John Coysgame, Esq. *Coombe-wood, Kingston, Surrey.*
1853	Simmons, Edward R., Esq., Barrister-at-Law. *Nevill-house, Belgrave-terrace, Brighton.*
1848	*Simmons, Lieut.-General Sir John L. A., R.E., K.C.B. *Lieut.-Governor Royal Military Academy, Woolwich, S.E.*
1866	Simons, Henry M., Esq. *Tyersall-crescent, Wood-road, Sydenham-hill, S.E.*
1864	2440 Simpson, Frank, Esq. 17, *Whitehall-place, S.W.*
1863	*Simpson, William, Esq. 64, *Lincoln's-inn-fields, W.C.*
1866	*Sims, Richard Proctor, Esq., C.E. *Malabar-hill, Bombay. Care of Messrs. H. S. King and Co.*
1858	Skelmersdale, Edward, Lord. *Lathom-park, Ormskirk, Lancashire.*
1875	Skertchly, Joseph A., Esq. 189, *Glenarm-road, Clapton-park, E.*
1872	Skilbeck, A. Jos., Esq. 202, *Upper Thames-street, E.C.*
1873	Skilbeck, Jno. Hy., Esq. *The Hollies, Snaresbrook, E.*
1866	Skinner, John E. H., Esq. 3, *Dr. Johnson's-buildings, Temple, E.C.*
1863	Skrine, Henry D., Esq. *Warleigh-manor, near Bath.*
1871	Slade, Henry, Esq., Staff-Surgeon, R.N. *Army and Navy Club, S.W.; and Royal Western Yacht Club, Plymouth.*
1870	2450 Sladen, Major E. B. (Polit. Agent at the Court of H.M. the King of Burmah). *Care of Messrs. Grindlay and Co., 55, Parliament-street, S.W.*
1861	Sladen, Rev. Edward Henry Mainwaring. *The Gore, Bournemouth.*
1872	Smale, Sir John, K.C.B., Chief Justice, Hong-Kong. *Care of Clements Smale, Esq., 46, York-terrace, Regent's-park, N.W.*
1865	Smedley, Joseph V., Esq., M.A. *Oxford and Cambridge Club, S.W.*
1871	Smetham, John Osborne, Esq. *King's Lynn, Norfolk.*
1860	*Smith, Augustus Henry, Esq. *Flexford-house, Guildford.*
1873	*Smith, B. Leigh, Esq., M.A. *Oxford and Cambridge Club, Pall-mall, S.W.*
1875	Smith, David Murray, Esq. 31, *Dick-place, Grange, Edinburgh.*
1871	Smith, Major C. B. Euan. 14, *St. James's-square, S.W. Care of King and Co., Cornhill, E.C.*
1859	Smith, Edward, Esq. *Windham Club, S.W.*
1871	2460 Smith, Geo. Fereday, Esq., M.A., J.P., &c. *Grovehurst, Tunbridge-wells.*

Year of Election	
1873	Smith, Griffiths, Esq. *The Grove, Highgate, N.*
1865	Smith, Guildford, Esq. 63, *Charing-cross, S.W.*
1861	Smith, Jervoise, Esq. 47, *Belgrave-square, S.W.*
1853	Smith, John Henry, Esq. 1, *Lombard-st., E.C.; and Purley, Croydon, Surrey.*
1861	*Smith, Joseph Travers, Esq. 25, *Throgmorton-street, E.C.*
1857	Smith, Captain Philip, Grenadier Guards.
1873	Smith, Dr. Porter, M.D. *Shepton Mallet, Somersetshire.*
1874	*Smith, R. Barr, Esq. *Torrens-park, Adelaide, S. Australia.*
1868	*Smith, Major Robert M., R.E., Director of the Telegraphic Establishment in Persia. *Teheran.*
1874	2470 Smith, Rupert, Esq. *Hart's-hill-cottage, Brierley-hill, Stafford; and The Priory, Dudley.*
1841	*Smith, Thomas, Esq.
1859	*Smith, W. Castle, Esq. 1, *Gloucester-terrace, Regent's-park, N.W.*
1859	Smith, William Henry, Esq., M.P. 1, *Hyde-park-street, W.*
1875	Smith, Wm. Hy., Esq. *Care of Messrs. Allan Bros., and Co., James-street, Liverpool.*
1857	*Smith-Bosanquet, Horace, Esq. *Broxbourne-bury, Hoddesdon.*
1869	Smyth, Colonel Edmund. *Welton-hill, Louth, Lincolnshire.*
1869	*Smyth, Warington, Esq., F.R.S. 92, *Inverness-terrace, W.*
1837	*Smyth, Rear-Admiral William. *Care of Messrs. Child and Co., Temple-bar.*
1850	*Smythe, Major-General William J., R.A., F.R.S.
1872	2480 Snooke, William, Esq. 20, *Northampton-park, Canonbury, N.*
1865	*Solomons, Hon. George. *Jamaica.*
1839	*Somers, Charles, Earl. 49, *Prince's-gate, S.W.; Eastnor-castle, Herefordshire; and The Priory, Reigate, Surrey.*
1862	Somerset, Capt. Leveson E. H., R.N. *Care of Messrs. Chard, 3, Clifford's-inn, Fleet-street, E.C.*
1855	Sopwith, Thos., Esq., M.A., C.E., F.R.S. 103, *Victoria-street, Westminster, S.W.*
1860	Southesk, The Right Hon. James Carnegie, Earl of. *Kinnaird Castle, Brechin, N.B.*
1860	*Southey, James Lowther, Esq. *Care of Messrs. Stilwell, Arundel-street, Strand.*
1869	Southwell, Thomas Arthur Joseph, Viscount. *Windham Club, S.W.*
1872	Spalding, Captain H., 104th Regiment. *Dover.*
1865	Spalding, Samuel, Esq. *Thornleigh, Sydenham-hill, S.E.*
1870	2490 Sparks, J. Hyde, Esq. *Conservative Club, S.W.*
1874	Sparrow, William, Esq. *Albrighton-hall, Shrewsbury.*
1873	Spence, Jas. Mudie, Esq. *Erlington-house, Whalley-range, Manchester.*
1873	Spence, Jno. Berger, Esq., F.G.S., &c. *Erlington-hall, Whalley-range, Manchester.*
1870	Spencer, Admiral the Hon. J. W. S. 5, *Portman-street, W.*
1874	Spencer, Walter, Esq. 10, *Guilford-place, Russell-square, W.C.; and Cavendish Club,* 307, *Regent-street, W.*
1867	Spicer, Edward, Esq. 19, *New Bridge-street, E.C.*
1874	Spicer, Jas., Esq. *The Harts, Woodford, Essex.*

Year of Election.

1874 Spicer, Capt. Richard W. 3, *Chesham-place, Belgrave-square, S.W.*

1863 Spickernell, Dr. Geo. E., Principal of Eastman's Royal Naval Establishment. *Eastern-parade, Southsea.*

1855 2500*Spottiswoode, William, Esq., F.R.S. 50, *Grosvenor-place, S.W.*

1859 *Spratt, Rear-Admiral Thos. A. B., C.B., F.R.S. *Clare-lodge, Nevill-park, Tunbridge-wells, Kent.*

1866 Spruce, Richard, Esq., PH.DR. *Welburn, Castle Howard, York.*

1871 Square, William, Esq., F.R.C.S. 22, *Portland-square, Plymouth.*

1859 Stafford, Edward W., Esq. Colonial Secretary of New Zealand. *Care of Mr. J. S. Tytler*, 19, *Castle-street, Edinburgh.*

1853 Stanford, Edward, Esq. 6, *Charing-cross, S.W.*

1855 Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries, F.R.S. 3, *Grosvenor-place-houses, Grosvenor-place, S.W.; and Chevening, Sevenoaks, Kent.*

1860 *Stanhope, Walter Spencer, Esq. *Cannon-hall, Barnsley, Yorkshire.*

1875 Stanley, Hon. E. Lyulph. 82, *Harley-street, W.*

1870 Stanley, Lieut. Henry, R.N. *Admiralty Survey, Melbourne. Care of Captain J. E. Davis*, R.N.

1872 2510*Stanley Walmsley, Esq., C.E. *Care of Messrs. Cutbill, Son, and Delungo*, 103, *Cannon-street, E.C.*

1869 Stanton, Charles Holbrow, Esq. 65, *Redcliffe-gardens, S.W.*

1863 Stanton, George, Esq. *Coton-hill, Shrewsbury; and Conservative Club, S.W.*

1867 Stanton, Henry, Esq. 1, *River-street, Myddelton-square, E.C.*

1871 Stark, Wm. Emery Esq. *Rydal-lodge, New-park-road, Brixton-hill.*

1870 Starling, Joseph, Esq. *Boresford-lodge, Dyke-road, Brighton.*

1856 Statham, John Lee, Esq. 60, *Wimpole-street, W.*

1868 Staveley, Major-Gen. Sir Charles, K.C.B., Commander-in-chief, Bombay. *Care of Mr. H. Saunders*, 24, *Tichborne-street, W.; and United Service Club, S.W.*

1869 *Staveley, Miles, Esq. *Old Sleningford-hall, Ripon.*

Stebbing, Edward Charles, Esq. *National Debt Office*, 19, *Old Jewry, E.C.;*
1863 *and The Aspens, Sunbury.*

1867 2520Steel, Capt. J. P., R.E. *Junior United Service Club, S.W. Care of Messrs. Grindlay and Co.*, 55, *Parliament-street, S.W.*

1868 Steel, William Strang, Esq. 65, *Lancaster-gate, Hyde-park, W.*

1871 Stein, Hon. Robert. *Port Louis, Mauritius. Care of Robt. McKerrell, Esq.*, 45, *Inverness-terrace, W.*

1870 Stenning, Charles, Esq. 3, *Upper Hamilton-terrace, N.W.*

1872 Stephani, Albert, Esq. (Kt. of Bederkesa), LL.D., PH.D., Secretary to Chamber of Commerce and Industry for Silesia. *Troppau, Silesia. Care of the Austro-Hungarian Consulate*, 29, *St. Swithin's-lane, E.C.*

1830 *Stephen, Sir George. *Melbourne. Care of Mr. H. W. Ravenscroft*, 7, *Gray's-inn-square, W.C.*

1874 Stephens, Harold, Esq. *Finchley, N.W.*

1870 *Stephens, Thomas Wall, Esq. *North-villa, Regent's-park, N.W.*

1869 Stephenson, B. Charles, Esq. 12, *Bolton-row, Mayfair, W.*

Year of Election.	
1857	Stephenson, Sir R. Macdonald, C.E. 72, *Lancaster-gate, W.; and East-cottage, Worthing.*
1866	2530 Stepney, A. K. Cowell, Esq. 6, *St. George's-place, Knightsbridge, S.W.*
1869	Steuart, Colonel T. R., Bombay Army. *Esgair, Machynlleth, Wales.*
1874	Stevens, George Richard, Esq. 2, *Phillimore-terrace, Allen-street, Kensington, W.*
1855	Stevens, Henry, Esq., F.S.A. 4, *Trafalgar-square, W.C.*
1841	Stevenson, Thomas, Esq., F.S.A. *Iver Heath, Bucks.*
1874	Steward, Major Edward H., R.E. *War-office, Whitehall, S.W.*
1873	Stewart, A. J. R., Esq. 34, *Wimpole-street, W.; and Ards-house, Co. Donegal.*
1869	Stewart, Major C. E., I.A., Bengal Staff Corps. *Care of Sir Thos. Dyer,* K.C.B. 14, *Redcliffe-square, S.W.*
1874	Stewart, Gilbert McLeod, Esq. 1, *Westminster-chambers, S.W.*
1871	*Stewart, Captain Herbert, 3rd Dragoon Guards. *The Barracks, York.*
1866	2540 Stewart, Rev. Dr. James. *Lovedale, Alice, South Africa. Care of Robert Young, Esq., Offices of the Free Church of Scotland, Edinburgh.*
1860	*Stewart, Major J. H. M. Shaw, Royal Madras Engineers.
1869	Stewart, J. L., Esq., M.D., Forest Department, India.
1874	Stewart, Robert, Esq. *Port Elizabeth, Cape of Good Hope. Care of Standard Bank,* 10, *Clement's-lane, Lombard-street, E.C.*
1872	Stewart, Wm., Esq., M.D.
1873	Stewart, Admiral Wm. Houston, C.B. 53, *Warwick-square, S.W., and Admiralty, S.W.*
1870	Stilwell, Henry, Esq., M.D. *Moorcroft, Hillington, Uxbridge.*
1875	Stirling, Sir Chas. E. F., Bart. 16, *Bryanston-square, W.; Glorat, near Glasgow; and Junior Carlton Club.*
1860	Stirling, Capt. Frederick H., R.N. *H.M.S. 'Hero'; and United Service Club, S.W.*
1875	*Stirling, J. Carolus, Esq. 9, *South Eaton-place, S.W.*
1863	2550 Stirling, Sir Walter, Bart. 36, *Portman-square, W.*
1868	Stock, Thomas Osborne, Esq. 44, *Eastbourne-terrace, W.*
1860	Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.*
1845	*Stokes, Rear-Admiral John Lort. *United Service Club, S.W.; and Scotchwell, Haverfordwest, Wales.*
1868	Stone, David H., Esq., Alderman.
1874	Stone, Octavius, C., Esq. *Stoney-gate, Leicester.*
1867	*Story, Edwin, Esq., M.A. 88, *Oldfield-road, Stoke Newington, N.*
1868	Stovin, Rev. Charles F. 59, *Warwick-square, S.W.*
1866	Strachey, Major-General Richard, R.E., C.S.I., F.R.S. *India-office, S.W.*
1861	Strange, Lieut.-Col. Alexander, F.R.S. *India Store Department, Belvedere-road, Lambeth, S.E.*
1858	2560 Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.*
1864	Straton, Rev. N. D. J. *Kirkby-wharf, Tadcaster.*
1873	Straughton, Joseph, Esq. *Cockermouth, Cumberland.*

Year of Election.

1860 Strickland, Edward, Esq., C.B., Commissary-General. *Care of Sir Chas. R. M'Grigor, Bart., & Co., 25, Charles-street, St. James's-square, S.W.*

1868 *Strode, Alf. Rowland Chetham, Esq. *Dunedin, Otago, New Zealand.*

1853 Strousberg, Dr. Bethel Henry. 5, *Grosvenor-place, S.W.*

1874 Strousberg, Hy., jun., Esq. 5, *Grosvenor-place, S.W.*

1853 Strutt, George H., Esq., F.R.A.S. *Bridge-hill, Belper.*

1873 Stuart, Lieut.-Gen. Charles. 5, *Granville-place, Portman-square, W.*

1859 Stuart, Lieut.-Col. J. F. D. Crichton. 25, *Wilton-crescent, Belgrave-sq., S.W.*

1861 2570 Stuart, Right Hon. Sir John. *Loch Carron, Ross-shire; and 5, Queen's-gate, Hyde-park, W.*

1866 Stuart, Major Robert. *Janina, Albania.*

1873 Sturgeon, Wentworth, Esq. 14 *and* 15, *St. Swithin's-lane, E.C.*

1872 Sturt, Henry, Esq., jun. 119, *Holland-road, Kensington, W.*

1872 Styan, Arthur, Esq., F.S.A. 28, *Norfolk-crescent, Hyde-park, W.*

1858 Sudeley, Charles G. Hanbury Tracy, Lord. 5, *Bolton-row, W.; and Toddington, near Broadway, Worcester.*

1857 Sulivan, Rear-Admiral Sir Bartholomew J., R.N., K.C.B. *Bournemouth.*

1873 Sullivan, Sir Edwd., Bart. 13, *Grosvenor-place, S.W.*

1865 Sullivan, Captain T. W., C.B., R.N.

1869 Summerhayes, William, Esq., M.D.

1862 2580 Surridge, Rev. Henry Arthur Dillon, M.A. 21, *Berners-street, W.*

1862 Surtees, Colonel Charles Freville. *Chalcott-house, Long Ditton, Surrey.*

1873 Sutherland, Geo., Esq. *Arboretum-square, Derby.*

1861 *Sutherland, George Granville William, Duke of, F.R.S. *Stafford-house, St. James's-palace, S.W.*

1869 Sutherland, Robert, Esq. *Egham-rise, Surrey.*

1869 Sutherland, Thomas, Esq. 38, *Thurloe-square, S.W.*

1871 Sutton, W. P., Esq., LL.D., F.S.A., &c.

1873 Suzuki, Kinzo (Sec. of Japanese Leg.). 9, *Upper Belgrave-st., Belgrave-sq., S.W.*

1875 Swain, Edward, Esq. *Three Counties Asylum, Stotfold, Baldock.*

1871 Swan, Major Percival. 114, *Piccadilly, W.*

1857 2590 Swanzy, Andrew, Esq. *Sevenoaks, Kent.*

1875 Swart, Hon. N. J. R. *Pretoria, S. African Republic; care of J. J. Pratt, Esq.,* 24, *Coleman-street, E.C.*

1836 *Swinburne, Rear-Admiral Charles H. *Holmewood, Henley-on-Thames.*

1862 *Swinburne, Commr. Sir John, Bart., R.N. *Capheaton, Newcastle-on-Tyne.*

1863 Swinhoe, R., Esq., H.B.M. Consul, Taiwan. 33, *Carlyle-square, S.W.*

1871 Syme, Henry, Esq. 60, *Palace-gardens-terrace, Campden-hill, W.*

1864 Symonds, F., Esq., M.D. *Beaumont-street, Oxford.*

1875 Symons, Lieut. J. E., R.N. 12, *Royal-avenue, S.W.*

1852 *Synge, Colonel Millington H., R.E. *Alvercliff, Alverstoke, Hants.*

1875 Szlumper, Jas. Weeks, Esq. *Aberystwyth.*

Year of Election.

1852 2600 Tagart, Courtenay, Esq. *Reform Club, Pall-mall.*

1859 Tagart, Francis, Esq. 31, *Craven-hill-gardens, Hyde-park, W.*

1866 Taintor, Edward C., Esq. (Imperial Chinese Customs). *China. Care of H. C. Batchelor, Esq., 2, King William-street, E.C.*

1857 *Tait, Robert, Esq. 14, *Queen Anne-street, W.*

1861 Talbot de Malahide, James Talbot, Lord, F.R.S. *Malahide Castle, Co. Dublin.*

1861 Taylor, Commander A. Dundas, I.N. (Director of Marine Surveys), Calcutta. *Care of Messrs. H. S. King and Co., 65, Cornhill, E.C.*

1875 Taylor, C. A., Esq. *Boughton-place, Maidstone.*

1873 Taylor, Charles, Esq. *Church-house-school, Ealing, W.*

1869 Taylor, George N., Esq. *National Bank, Old Broad-street, E.C.*

1865 Taylor, H. L., Esq. *Reform Club, S.W.; and 23, Phillimore-gardens, Kensington, W.*

1873 2610 Taylor, Jas. Banks, Esq. *Thatched-house Club, St. James's, S.W.*

1874 Taylor, Jas. Benjamin, Esq. *Piersfield, Lower Streatham, Surrey.*

1865 Taylor, Rev. Jas. Hudson. 6, *Pyrland-road, Newington-green, N.*

1871 *Taylor, John, Esq. *The Rocks, Bath; and Booth-hall, Blackley, Lancashire.*

1863 Taylor, John, Esq. 110, *Fenchurch-street, E.C.*

1870 *Taylor, John Fenton, Esq. 20, *New-street, Spring-gardens, S.W.*

1867 *Taylor, John George, Esq. H.B.M. Consul in Kurdistan, Diarbekir. *Care of Messrs. O'Brien and Co., 43, Parliament-street, S.W.*

1854 *Taylor, John Stopford, Esq., M.D. 1, *Springfield, St. Anne-street, Liverpool.*

1863 Taylor, Maj.-Gen. R. C. H., C.B. 16, *Eaton-place, S.W.; and Carlton Club, S.W.*

1873 Taylor, Wm. Richard, Esq., Deputy-Commissary. *Fort George, Inverness-shire.*

1875 2620 Tedlie, Lieut.-Colonel William. 3, *The Grove, Boltons, South Kensington, W.*

1865 Teede, Chas., Esq. 12, *Granville-park, Blackheath.*

1875 Telfer, Commr. Buchan, R.N. *Care of Messrs. Woodhead and Co., 44, Charing-cross, S.W.*

1864 Temple, Sir Richard, K.C.S.I.

1860 Templeton, John, Esq. 24, *Budge-row, E.C.*

1857 Tennant, Professor James. 149, *Strand, W.C.*

1873 Terashima, Munenori (His Japanese Majesty's Envoy Extraordinary and Minister). 9, *Upper Belgrave-street, Belgrave-square, S.W.*

1872 Terrero, Maximo, Esq. 88, *Belsize-park-gardens, N.W.*

1870 Teschemacher, Edward Fred., Esq. 1, *Highbury-park-north, N.*

1830 *Thatcher, Colonel E.I.C.

1874 2630 Thomas, Chas. Evan, Esq. 98, *Queen's-gate, S.W.*

1863 Thomas, G., Esq.

1854 Thomas, Henry Harrington, Esq. 8, *Camden-crescent, Bath.*

1872 Thomas, James Lewis, Esq., War-office, Horse Guards. 26, *Gloucester-street, Warwick-square, S.W.; and Thatched House Club, St. James's-street, S.W.*

1865 Thomas, John Henwood, Esq. *East India Dept., Custom-house, E.C.*

1864 Thomas, J. R., Esq., Staff Assist. Surg. *Castle-hill, Fishguard, Pembrokeshire.*

Year of Election.	
1874	Thomas, R. Gerard de V., Esq., M.A. *Eyhorne-house, Maidstone; and Universities Club, Jermyn-street, S.W.*
1875	Thompson, John Geo., Esq., M.A. *St. Mary's College, Peckham, E.C.*
1869	Thompson, Lieut.-Col. George, C.E., Cordoba, Argentine Confederation. *Care of Messrs. Parlane, Graham, and Co., Buenos Ayres; Messrs. Lumb, Wanklyn, and Co., 10, Angel-court, Throgmorton-street, E.C.*
1869	*Thompson, Henry Yates, Esq. 32, *Ennismore-gardens, S.W.*
1872	2640 Thompson, Lieut. Richard, R.E. 22, *St. Mary's, Bedford.*
1874	Thompson, Thomas, Esq. *Durban, Natal, South Africa.*
1863	Thomson, James, Esq. *Dunstable-house, Richmond.*
1863	Thomson, James Duncan, Esq., Portuguese Consul. *St. Peter's-chambers, Cornhill, E.C.*
1848	*Thomson, J Turnbull, Esq., Chief Surveyor. *Otago, New Zealand.*
1866	Thomson, John, Esq. 34, *Wiltshire-road, Brixton, S.W.*
1861	*Thomson, Ronald Ferguson, Esq. *Care of Messrs. O'Brien and Co.*, 43, *Parliament-street.*
1854	*Thomson, Thomas, Esq., M.D., F.R.S. *The Cottage, W. Farleigh, Maidstone.*
1865	• Thomson, W. T., Esq.
1862	*Thorne, Augustus, Esq. 4, *Cullum-street, City, E.C.*
1867	2650 Thornton, Edward, Esq., C.B. *Harrow.*
1847	Thornton, Rev. Thomas Cooke, M.A., M.R.I.A. *Brock-hall, near Weedon, Northamptonshire,*
1858	Thorold, Rev. A. W. 31, *Gordon-square, W.C.*
1868	Thorold, Alexander W. T. Grant, Esq. *Medsley, Great Grimsby, Lincolnshire.*
1871	Thorpe, Wm. Geo., Esq., F.G.S. *Gloucester-house, Larkhall-rise, S.W.; and Barton's-house, Ipplepen, Newton Abbot, Devon.*
1859	Thuillier, Colonel H. L., C.S.I., Surveyor-General of India, F.R.S. *Calcutta. Care of Messrs. Grindlay and Co.*, 55, *Parliament-street.*
1872	Thuillier, Capt. Hy. R., R.E. *King and Co., Pall-mall.*
1865	*Thurburn, C. A., Esq. 16, *Kensington-park-gardens, Notting-hill, W.*
1864	*Thurburn, Hugh, Esq. 103, *Westbourne-terrace, W.*
1861	Thurlow, The Right Hon. Lord. *Dunphail, Forres, N.B.*
1874	2660 Thwaites, Capt. Joseph. 5, *Washington-terrace, Southampton.*
1874	Tighe, Col. Fred. *The Priory, Christchurch, Hants; and Travellers' Club, S.W.*
1868	Tilley, Henry Arthur, Esq. *Hanwell, Middlesex, W.*
1872	Tinline, George, Esq. 17, *Prince's-square, Bayswater, W.*
1874	*Tinné, J. Ernest, Esq. *Briarley, Aigburth, near Liverpool.*
1839	*Tinne, John A., Esq. *Briarley, Aigburth, near Liverpool.*
1873	Tipping, George B., Esq. *Coombe-lodge, Kingston-hill, Surrey.*
1862	Todd, John, Esq. *Eastcote-lodge, St. John's-park, Blackheath, S.E.*
1865	Todd, Rev. John W., D.D. *Tudor-hall, Forest-hill, Sydenham, S.E.*
1875	Toler, Geo. Graham S., Esq. 54, *Queen's-gate-terrace, W.*
1853	2670 *Tomlin, George Taddy, Esq., F.S.A. *Combe-house, Bartonfields, Canterbury.*
1853	Tomline, George, Esq. 1, *Carlton-house-terrace, S.W.*

Year of Election.	
1873	Tomlinson, John, Esq. *St. Peter's-college, Peterborough.*
1856	Torrance, John, Esq. 5, *Chester-place, Hyde-park-square, W.*
1866	Torrens, Sir Robert Richard, K.C.M.G. 2, *Gloucester-place, Hyde-park, W.; and The Cott, Holm, near Ashburton, South Devon.*
1875	Townshend, Capt. F. French (2nd Life Guards). *Arthur's Club, St. James's-street, S.W.*
1859	Townshend, Commander John, R.N. 12, *Macaulay-road, Clapham, S.W.*
1866	Townson, Wm. Parker, Esq., B.A. Cantab. *Care of Miss Townson, Ash-house, Caton, near Lancaster.*
1846	*Towry, George Edward, Esq.
1873	Towse, John Wrench, Esq. *Fishmongers'-hall, London-bridge, E.C.*
1858	2680 Towson, J. Thomas, Esq. 47, *Upper Parliament-street, Liverpool.*
1864	*Toynbee, Capt. Henry. 12, *Upper Westbourne-terrace, W.*
1863	*Tozer, Rev. H. F., M.A. *Exeter College, Oxford.*
1864	Tracy, The Hon. C. H. 11, *George's-street, W.*
1863	*Travers, Arch., Esq. 28A, *Addison-road, Kensington, W.*
1867	Tremenheere, Major-General C. W., C.B., R.E. 1, *Porchester-square, Bayswater.*
1859	Tremlett, Rev. Francis W., M.A., D.C.L., PH.D., *Belsize-park, Hampstead, N.W.*
1869	Trench, Captain Frederic. *Naval and Military Club, Piccadilly, W.*
1865	*Trench, Major the Hon. Le Poer, R.E. 32, *Hyde-park-gardens, W.; and Ordnance-survey-office, Pimlico, S.W.*
1863	Trestrail, Rev. Frederick. *St. John's-road, Newport, Isle of Wight.*
1872	2690 Treuenfeld, Richard von F., Esq. 12, *Queen Anne's-gate, Westminster, S.W.*
1862	Trevelyan, Sir Charles Edward, Bart. K.C.B. 8, *Grosvenor-crescent, S.W.*
1830	Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.N.A., &c. *Athenæum Club, S.W.; Wallington, Northumberland; and Nettlecombe, Somerset.*
1864	Trimmer, Edmund, Esq. 41, *Botolph-lane, E.C.*
1875	Trinder, Wm. Hy., Esq. 28, *Blandford-square, N.W.*
1867	Tritton, Joseph Herbert, Esq. 54, *Lombard-street, E.C.*
1871	Trivett, Captain John Fredk., R.N.R. *The Homestead, Hackney-common, N.E.*
1869	Trotter, Capt. Henry, R.E. *Care of Messrs. Richardson*, 23, *Cornhill, E.C.*
1872	Trotter, Captain J. Moubray. *Naval and Military Club, Piccadilly, W.*
1874	*Trotter, William, Esq. 11, *Hertford-street, Mayfair, W.*
1870	2700 Trutch, J. W., Esq. (Chief Commissioner of Lands and Works). *British Columbia.*
1867	Tryon, Captain George, R.N., C.B. *Army and Navy Club, S.W.*
1862	Tuckett, Francis Fox, Esq. *Frenchay, near Bristol.*
1835	*Tuckett, Frederick, Esq. 4, *Mortimer-street, Cavendish-square, W.*
1865	Tuckett, Philip D., Esq. *Southwood-lawn, Highgate, N.*
1852	Tudor, Edward Owen, Esq., F.S.A. 1, *Portugal-street, Grosvenor-square, W.*
1857	Tudor, Henry, Esq. 12, *Portland-place, W.*
1864	Turnbull, George, Esq., C.E., F.R.A.S. 23, *Cornwall-gardens, South Kensington, W.*
1834	*Turnbull, Rev. Thomas Smith, F.R.S. *University Club, S.W.; and Blofield Norfolk.*
1873	Turner, Hon. George.

Year of Election.	
1874	2710 Turner, H. G., Esq. Madras Civil Service 14, *St. James's-square, S.W.*
1870	Turner, Lieut.-General Henry Blois, Bomb. Eng. 131, *Harley-street, W.*
1874	Turner, Jos. Edward, Esq. 30, *King-street, Cheapside, E.C.*
1863	Turner, Thomas, Esq. *Guy's-hospital, Southwark, S.E.*
1867	Tweedie, Captain Michael, R.A. *Woolwich.*
1864	*Twentyman, A. C., Esq. *Castlecroft, near Wolverhampton.*
1863	Twentyman, William H., Esq. *Ravensworth, St. John's-wood-park, N.W.*
1849	Twiss, Sir Travers, D.C.L., F.R.S. 3, *Paper-buildings, Temple, E.C.*
1874	Twite, Charles, Esq. 5, *Victoria-street, S.W.*
1858	Twyford, Captain A. W., 21st Hussars. *Resident Commissioner, H.M.'s Convict Prisons, British Guiana. Care of A. J. Murray, Esq., 7, Whitehall-place, S.W.; and Reform Club, S.W.*
1865	2720 Tyer, Edward, Esq., C.E., F.R.A.S. 15, *Old Jewry-chambers, E.C.*
1862	*Tyler, George, Esq. 24, *Holloway-place, Holloway-road, N.*
1873	Tyler, W. James, Esq. *West-hill, Sydenham, Kent.*
1859	Tytler, Colonel W. Fraser. *Aldowrie, Inverness.*
1869	Underdown, E. M. Esq., 3, *King's-Bench-walk, Temple, E.C.*
1862	Underhill, Edward Bean, Esq., LL.D. *Derwent-lodge, Thurlow-road, Hampstead, N.W.*
1868	Unwin, Howard, Esq., C.E. *Oxford-court,* 109A, *Cannon-street, E.C.*
1861	Ussher, John, Esq. *Arthur's Club, St. James's-street, S.W.*
1844	*Vacher, George, Esq. *Manor-house, Teddington.*
1874	Valentine, William J., Esq. *Homedale-house, Gypsy-hill, Upper Norwood; and* 18, *Cornhill, E.C.*
1872	2730 *Vallentin, James R., Esq. 55, *Cow-cross, E.C.*
1862	*Vander Byl, P. G., Esq. 126, *Harley-street, W.*
1865	Vane, G., Esq. *Ceylon. Messrs. Price and Boustead, Craven-st., Strand, W.C.*
1875	Vans-Agnew, Robert, Esq., M.P. 44, *St. James's-place, S.W.*
1856	*Vaughan, James, Esq., F.R.C.S. *Builth, Breconshire.*
1852	*Vavasour, Sir Henry M., Bart. *Dane End, Ware, Herts.*
1855	Vavasseur, James, Esq. *Knockholt, near Sevenoaks, Kent.*
1871	Vereker, Lieut.-Col. the Hon. Chas. Smyth. *The Avenue, Beulah-hill, S.E.*
1863	*Vereker, The Hon. H. P., LL.D., H.M. Consul at Charante. 1, *Portman-square, W.*
1862	Verner, Edward Wingfield, Esq., M.P. *The Aske, Bray, Ireland.*
1862	2740 *Verney, Commr. Edmond H., R.N. *Rhianva, Bangor, North Wales.*
1837	*Verney, Sir Harry C., Bart., F.R.A.S. *Travellers' Club, S.W.; and Claydon-house, Bucks.*

Year of Election.	
1857	Verrey, Charles, Esq.
1852	Verulam, James Walter, Earl of. *Gorhambury, near St. Alban's; Barry-hill, Surrey; and Messing-hall, Essex.*
1865	Vile, Thomas, Esq. 75, *Oxford-terrace, W.*
1874	*Vincent, Capt. Chas. (late I.N.)
1873	Vincent, Capt. Charles Edward Howard. *Royal United Service Institution, Whitehall-yard, S.W.*
1857	Vincent, John, Esq. 2, *Ulster-terrace, Regent's-park, N.W.*
1865	*Vincent, M. C., Esq., Professorof Economic Geology and Metallurgy; Inspector of Mines, &c. *Cincinnati, U.S.; and* 127, *Strand, London.*
1871	Vine, Lieut. Wm. W., R.N. *Ivanhoe-villa, Waverley-road, Southsea.*
1858	2750 Vines, William Reynolds, Esq., F.R.A.S. *Care of Sydney H. Vines, Esq., Christ's College, Cambridge.*
1874	Viney, Rev. Josiah. *Fernwood, Highgate, N.*
1872	Vivian, Hon. H. Crespigny. *Foreign-office, S.W.*
1863	Vivian, Major Quintus. 17, *Chesham-street, Belgrave-square, S.W.*
1863	*Vyvyan, Sir Richard Rawlinson, Bart., F.R.S. *Trelowarren, Cornwall.*
1864	Wade, R. B., Esq. 13, *Seymour-street, Portman-square, W.*
1873	Wade, Thos. F., Esq., C.B., H.B.M. Secretary of Legation. *Pekin, China.*
1873	*Wagner, Henry, Esq., M.A. 16, *King-street, St. James's, S.W.*
1853	*Wagstaff, William Racster, Esq., M.D., M.A.
1869	Waite, Charles, Esq., LL.D., Principal of St. John's College. *Weighton-road, South Penge-park, S.E.*
1863	2760 Waite, Henry, Esq. 3, *Victoria-street, Pimlico, S.W.*
1867	*Waite, Rev. John.
1874	Walburn, Edmund, Esq., M.A., Principal of Grosvenor College. 366, *Brixton-road, S.W.*
1871	Wakley, Thos. Finsbury Septimus, Esq., C.E. *College-terrace, Guernsey.*
1873	*Walford, Lionel N., Esq. 66, *Lowndes-square, S.W.*
1874	Walkem, Hon. Geo. Anthony. *British Colambia. Care of G. M. Sproat, Esq.,* 4, *Lime-street-square, E.C.*
1870	*Walker, Albert, Esq. *Auckland Club, New Zealand. Care of L. C. Walker, Esq.,* 3, *Hartley-villas, Lansdowne-road, Croydon.*
1862	Walker, Major-General C. P. Beauchamp, C.B. 2, *Cranley-place, Onslow-square, S.W.; and United Service Club, S.W.*
1872	Walker, Capt. Campbell, Madras Staff Corps. *The Lawn, Esher.*
1861	Walker, Edward Henry, Esq., Consul at Cagliari. *Care of Messrs. Drummond.*
1863	2770 *Walker, Frederick John, Esq. *The Priory, Bathwick, Bath.*
1859	*Walker, Colonel James T., F.R.S., Royal Engineers. Supt. Gt. Trig. Survey of India. *Dehra Doon, India. Care of Messrs. H. S. King and Co.,* 65, *Cornhill, E.C.*
1873	Walker, John, Esq. 15, *Loughborough-road, North Brixton.*
1861	*Walker, John, Esq.

Year of Election.

1858 *Walker, Captain John, H.M.'s 66th Foot. Broom-hill, Colchester.

1871 *Walker, Capt. J. B. East Bank, Oxton, Birkenhead; and Old Calabar, near Bonny, West Africa.

1864 Walker, R. B. N., Esq. Care of Mr. Blissett, 38, South Castle-street, Liverpool.

1874 Walker, Robert, Esq. 4, Westminster-chambers, Victoria-street, S.W.

1863 *Walker, T. F. W., Esq. 6, Brock-street, Bath; and Athenæum Club, S.W.

1874 Walker, W. Fredk., Esq. Moore-park-villas, Walham-green.

1861 2780 Walker, Rev. William. Grammar-school, Hanley-castle, Upton-on-Severn.

1866 Walker, William, Esq., F.S.A. 48, Hilldrop-road, Tufnell-park, N.

1868 Walkinshaw, William, Esq. Hartley-grange, Winchfield, Hants.

1854 *Wallace, Alfred Russell, Esq. The Dell, Grays, Essex.

1861 Wallace, Rev. Charles Hill, M.A. 3, Harley-place, Clifton, Bristol.

1872 Waller, Edmund, Esq. Hoe-street, Walthamstow, E.

1864 Waller, Rev. Horace. The Rectory, Twywell-by-Thrapston, Northamptonshire.

1863 Wallich, George C., Esq., M.D. Terrace-house, St. George's-terrace, Herne-bay.

1872 *Wallroth, Chas. Henry, Esq. Woodclyffe, Chislehurst.

1874 Walls, William, Esq. 2, Park-terrace, Glasgow.

1860 2790 Walpole, the Hon. F., M.P. 4, Dean-street, Park-lane, W.; and Rainthorpe-hall, Long Stratton, Norfolk.

1863 Walpole, Rt. Hon. Spencer, M.P., F.R.S. 109, Eaton-square, S.W.

1853 Walter, Henry Fraser, Esq. Papplewick-hall, near Nottingham.

1873 *Waltham, Edward, Esq. Watcombe-house, Stockwell-green, S.W.

1863 Walton, J. W., Esq. 26, Savile-row, W.

1864 Walton, R. G., Esq., C.E. Bombay.

1874 Ward, Edwin, Esq., F.Z.S. York-house, 69, Avenue-road, St. John's-wood, N.W.

1853 *Ward, George, Esq.

1860 Ward, Admiral J. Hamilton. Oakfield, Wimbledon-park, S.W.

1874 Ward, Jno., Esq. Royal Ulster Works, Belfast.

1868 2800 Ward, Captain the Hon. Wm. John, R.N. H.M.S. 'Cambridge,' Plymouth.

1869 Ward, William Robert, Esq. Nea-house, Christchurch, Hants.

1862 Wardlaw, John, Esq. 44, Prince's-gardens, Hyde-park, S.W.

1864 Warner, E., Esq. 49, Grosvenor-place, S.W.

1859 Warre, Arthur B., Esq. 109, Onslow-square, S.W.

1872 Warre, Rev. Edmond, M.A. Eton College.

1869 Warre, Major-General H. J., C.B. United Service Club, S.W.

1874 Warren, Capt. Charles, R.E. School of Gunnery, Shoeburyness.

1869 Warren, Charles, Esq. 17, Hanover-street, Peckham, S.E.

1862 Warren, Major Richard Pelham. Worting-house, Basingstoke.

1867 2810 Waterhouse, George Marsden, Esq. Care of Messrs. Morrison and Co., 4, Fenchurch-street, E.C.

1874 *Waterhouse, Capt. Jas., Bombay Staff Corps (Assistant Surveyor-General of India). Surveyor-General's-office, Calcutta. Care of Messrs. Trübner and Co., 59, Ludgate-hill, E.C.

Year of Election.	
1874	Waters, T., Esq., Surveyor-General to the Japanese Government. *Care of Albert Robinson, Esq., 30, Apsley-road, Clifton, Bristol.*
1871	Wates, Edward, Esq. *Glenthorne, 15, Harmer-street, Gravesend.*
1874	Watherstone, Rev. Jno. Dundas. *The Lecturer's House, Monmouth.*
1862	Watney, John, Esq. 34, *Clement's-lane, Lombard-street, E.C.*
1859	Watson, James, Esq. 24, *Endsleigh-street, W.C.*
1874	Watson, Sir James, Lord Provost of Glasgow. 9, *Woodside-terrace, Glasgow.*
1860	Watson, James, Esq., Barrister-at-Law. *Langley-house, Langley, Bucks.*
1861	Watson, John Harrison, Esq. 28, *Queensborough-terrace, Kensington-gardens, W.*
1872	2820 Watson, Robert, Esq. *Falcott-house, North-hill, Highgate, N.*
1867	Watson, Robert Spence, Esq. *Moss Croft, Gateshead-on-Tyne.*
1870	Watson, Thos., Esq., Portuguese Vice-Consul, Cape Town. *Care of J. R. Thomson and Co., St. Peter's-chambers, E.C.*
1868	Watson, Wm. Bryce, Esq. 5, *Lime-street-square, E.C.; and* 29, *Duke-street, St. James's, S.W.*
1871	Watt, Robert, Esq., C.E. *Ashley-avenue, Belfast.*
1872	Watts, H. Cecil, Esq. *Care of Messrs. Thacker and Co.*, 87, *Newgate-street, E.C.*
1872	Watts, John, Esq. *Over Court, near Bristol.*
1857	*Waugh, Maj.-General Sir Andrew Scott, Bengal Engineers, F.R.S., late Surveyor-General and Superintendent Great Trig. Survey. *Athenæum Club, S.W.; and* 7, *Petersham-terrace, Queen's-gate-gardens, South Kensington, S.W.*
1874	Waugh, Fras. Gledstanes, Esq., M.A. *Oxford and Cambridge Club, Pall-mall, S.W.*
1867	Waveney, Lord, F.R.S., &c. 7, *Audley-square, W.; and Flixton-hall, Harleston.*
1874	2830 Wayte, Rev. Wm., M.A. *Eton College.*
1868	Webb, Edward B., Esq., C.E., &c. 6A, *Victoria-street, Westminster, S.W.*
1872	Webb, Geo. P., Esq. *Junior Athenæum Club, Piccadilly, W.*
1858	*Webb, Capt. Sydney. *Riversdale, Twickenham.*
1862	*Webb, William Frederick, Esq. *Newstead Abbey, Notts; and Army and Navy Club, S.W.*
1836	*Webber-Smith, Major-General James. 14, *Cambridge-square, Hyde-park, W.*
1865	Webster, Alphonsus, Esq. 44, *Mecklenburgh-square, W.C.*
1858	Webster, George, Esq., M.D., J.P. *Dulwich, S.E.*
1866	Webster, George, Esq. 40, *Finsbury-circus, E.C.*
1874	Webster, James Hume, Esq. *Keith-lodge, Upper Norwood.*
1874	2840 Wedd, George, Esq. 51, *Queen's-gardens, Hyde-park, W.*
1860	Weguelin, Thomas Matthias, Esq., M.P. *Peninsular and Oriental Steam Navigation Co., Moorgate-street, E.C.*
1872	Weise, Jno., Esq. 103, *St. George's-road, Pimlico, S.W.*
1874	Weiss, Foveaux, Esq. 33, *Chester-terrace, Regent's-park, N.W.*
1851	Weller, Edward, Esq. 34, *Red-lion-square, W.C.*
1873	Wellings, Henry, Esq. 44, *Thistle-grove, South Kensington, W.*
1853	*Wellington, Arthur Richard, Duke of, Major-General, D.C.L. *Apsley-house, W.; and Strathfieldsaye, Hampshire.*

Year of Election.	
1870	*Wells, Arthur, Esq. *Nottingham.*
1872	Wells, J. C., Esq. *Southborough, Bickley, Kent.*
1864	Wells, Sir Mordaunt, late Chief Puisne Judge, Bengal. 107, *Victoria-street, S.W.*
1862	2850 Wells, William, Esq. 22, *Bruton-street, W.; and Redleaf, Penshurst, Kent.*
1863	Welman, Charles, Esq. *Norton-manor, Taunton.*
1868	Wentworth, William Charles, Esq.
1857	West, Lieut.-Colonel J. Temple.
1870	West, Raymond, Esq., Bomb. Civ. Service.
1873	West, William Nowell, Esq. 30, *Montagu-street, Russell-square, W.C.*
1872	Westendarp, Charles H., Esq. 51, *Lansdowne-road, Kensington-park, W.*
1873	Western, W. T., Esq. 11, *Montague-villas, Richmond, S.W.*
1863	*Westlake, John, Esq. 16, *Oxford-square, W.*
1853	Westmacott, Arthur, Esq. *Athenæum Club, S.W.*
1874	2860 Westmacott, E. Vesey, Esq.
1852	Weston, Alex. Anderdon, Esq., M.A. 74, *Queen's-gate, W.*
1862	Westwood, John, Esq. 24, *Coleman-street, E.C.*
1830	*Weyland, John, Esq., F.R.S. *Woodrising-hall, Norfolk.*
1866	Wharncliffe, Lord. 15, *Curzon-street, W.*
1861	Wharton, Rev. J. C. *Junior Athenæum Club, Piccadilly, W.*
1874	Wharton, Robert, Esq. 150, *Harley-street, W.*
1858	Wheatley, G. W., Esq. 150, *Leadenhall-street, E.C.*
1869	Whichelow, Rev. James Shearer. 7, *Crowland-terrace, Church-road, Islington, N.*
1853	*Whinfield, Edward Wrey, Esq., B.A. *Severn-grange, Worcester.*
1839	2870 *Whishaw, James, Esq., F.S.A. 32, *Harewood-square, N.W.*
1867	Whitaker, Thomas Stephen, Esq. *Everthorpe-hall, East Yorkshire; and Conservative Club, S.W.*
1868	Whitby, Rev. Thomas, M.A., &c. *St. Simon's-vicarage, Leeds.*
1875	White, Arthur, Esq. *The Cedars, Hammersmith-road, W.*
1857	White, Arthur D., Esq., M.D. 56, *Chancery-lane, W.C.*
1865	White, Lieut. Arthur Wellesley, R.A. 2, *Yorke-crescent, Nightingale-place, Woolwich.*
1873	White, Francis W., Esq. *Ningpo, China. Care of H. C. Batchelor, Esq., 2 King William-street, E.C.*
1875	White, Geo. F., Esq. 1, *Porchester-gate, Hyde-park, W.*
1857	White, Henry, Esq., F.S.A., J.P. 96, *Queen's-gate, Hyde-park, W.; and The Lodge, Hillingdon-heath, near Uxbridge.*
1874	White, Owen, W., Esq. *The Priory, Lewisham, S.E.*
1869	2880 White, Robert Owen, Esq. *The Priory, Lewisham, S.E.*
1866	White, W. A., Esq., H.M. Consul, Dantzic. *Care of G. C. Rowland, Esq., Librarian's Dept., Foreign-office, S.W.*
1863	*White, William O., Esq. 10, *Lime-st., E.C.; and Barnsfield, near Dartford, Kent.*
1873	*Whitehead, Chas., Esq., F.S.A. *Barming-house, Maidstone.*

Year of Election.	
1874	Whitehead, Colonel F. George. 84, *Portland-place, W.*
1862	Whitehouse, William Matthew Mills, Esq. 46, *Chepstow-place, Bayswater, W.; and Hardwicke-house, Studley, Warwickshire.*
1873	Whitford, John, Esq. *Care of Messrs. Sinclair, Hamilton and Co.*, 17, *St. Helen's-place, E.C.; and Alfred-street, Liverpool.*
1874	Whitmee, Rev. S. J. *Samoa, South Pacific. Care of Rev. J. Mullens, London, Mission House, Bloomfield-street, E.C.*
1865	Whymper, Edward, Esq. *Town-house, Haslemere.*
1875	Whyte, Jas., Esq. 24, *Oswald-street, Glasgow.*
1864	2890 Whyte, M. B., Esq.
1870	Whyte, W. Anthony, Esq. *Conservative Club, S.W.*
1869	Whytt, Ebenezer, Esq. *The Grove, Highgate, N.*
1873	Whytt, P. Falconer, Esq. *The Grove, Highgate, N.*
1871	*Wiggins, Joseph, Esq. (Exam. in Navig., &c.). 4, *The Elms, Sunderland.*
1870	*Wilder, Frederick, Esq. *Purley-hall, Reading.*
1867	Wilkins, J. E., Esq. 4, *Paper-buildings, Inner Temple, E.C.*
1866	Wilkinson, Alfred, Esq. 14, *Elvaston-place, South Kensington, S.W.*
1860	*Wilkinson, Major A. Eastfield, B.A. *Oudh Commission, India; 7, Cavendish-place, Brighton; and Army and Navy Club, S.W.*
1854	Wilkinson, Frederick E., Esq., M.D. *Sydenham, Kent, S.E.*
1865	2900 Wilkinson, Dr. G. 4, *St. John's-wood-villas, St. John's-wood, N.W.*
1875	Wilkinson, Capt. J. Fenwick. *Care of Geo. Tuson, Esq., Ilchester, Somerset.*
1865	Wilkinson, J. J., Esq. 31, *Duke-street, Westminster, S.W.*
1839	*Wilkinson, Sir John Gardner, D.C.L., F.R.S. *Brynfield-house, Reynoldston, Gower, Glamorgan.*
1874	Wilkinson, Joseph, Esq. (Town Clerk). *York.*
1872	*Willans, John Anderson, Esq. 2, *Glasgow-terrace, Lupus-street, Pimlico, S.W.*
1857	Willcock, J. W., Esq., Q.C. 6, *Stone-buildings, Lincoln's-inn, W.C.; and Rosenstead, Avenue-road, St. John's-wood, N.W.*
1872	Willems, Edouard Henri Léonard, Esq. 79, *Seymour-street, Hyde-park, W.*
1874	Williams, Clement, Esq. *Care of Messrs. H. S. King and Co.*, 65, *Cornhill, E.C.*
1863	Williams, Frederick G. A., Esq. *Chapel-stairs, Lincoln's-inn, W.C.*
1868	2910 *Williams, F. M., Esq. *Goonvrea, Penan, Aworthal, Cornwall.*
1856	Williams, Henry Jones, Esq. 12, *Hereford-gardens, Park-lane, W.; and* 82, *King William-street, E.C.*
1856	Williams, Henry R., Esq. 183, *Camden-road, N.*
1873	Williams, John Robert, Esq. *Junior Carlton Club and Carlton-chambers*, 12, *Regent-street, W.*
1868	*Williams, Michael, Esq. *Tregullow, Scorrier, Cornwall.*
1874	Williams, Rev. Watkin Herbert. *Vicar of Bodelwgddan, nr. St. Asaph, N. Wales.*
1857	Williams, Major-General Sir Wm. F., Bart., K.C.B., D.C.L., Commander-in-Chief, Canada. *Army and Navy Club, S.W.*
1867	Williams, W. Rhys, Esq., M.D. *Royal Bethlehem Hospital, S.E.*
1859	Willoughby, Henry W., Esq. 32, *Montagu-square, W.*

Year of Election.	
1873	*Willis, Colonel G. H. S., C.B. *United Service Club, Pall-mall, S.W.*
1870	2920 Wills, Peter Turner, 2, *Little Love-lane, Wood-street, E.C.*
1867	Wills, William Henry, Esq., J.P. *Hawthornden, Clifton Down, Bristol.*
1868	Wilson, Alexander, Esq. *Gatewick-house, Beckenham.*
1869	Wilson, Major Charles William, R.E. *Adair-house, St. James's-square, S.W.*
1865	Wilson, E., Esq. *Hayes-place, Bromley, Kent.*
1875	*Wilson, Capt. Chas. P. *Marine Department, Board of Trade, Whitehall-gardens, S.W.*
1872	Wilson, John Peter, Esq. *The Mount, Totnes, South Devon.*
1872	Wilson, Robert B. W., Esq. 3, *Beaufort-gardens, W.*
1862	*Wilson, Robert Dobie, Esq. 15, *Green-street, Grosvenor-square, W.*
1869	Wilson, Samuel King, Esq. 3, *Portland-terrace, Regent's-park, N.W.*
1860	2930 Wilson, Thomas, Esq. 38, *De Beauvoir-road, Kingsland, N.*
1869	Wilson, Rev. T. Given, B.A. 23, *Wynell-road, Forest-hill, S.E.*
1854	*Wilson, Admiral Thomas. 1, *Prince's-buildings, Clifton, Bristol.*
1872	Wilson, William Thomas, Esq. *Deutz, near Cologne.*
1866	Wiltshire, Rev. Thomas, M.A., F.G.S., F.L.S. 25, *Granville-park, Lewisham, S.E.*
1868	*Winch, W. Richard, Esq. *North Mymms-park, Hatfield.*
1870	Winchester, C. A., Esq. *Oriental Club, W.*
1875	Winchester, The Most Hon. the Marquis of. 1E, *Albany, W.; and Amport, St. Mary's, Andover.*
1873	Windram, James, Esq. (Banker). 80, *King William-street, E.C.*
1868	Wingate, T. F., Esq. 18, *Albion-street, Hyde-park-square, W.*
1873	2940 Winslow, Eugene Henry, Esq. *War-office, Pall-mall, S.W.*
1870	Wiseman, James, Esq. 1, *Orme-square, Bayswater, W.*
1870	Wiseman, Commr. Sir W., Bart., R.N. 88, *Belgrave-road, S.W.; and Lagos, W. Africa. Care of Messrs. Case and Loudensack,* 1, *James-street, Adelphi, W.C.*
1874	Wodehouse, H. E., Esq. *Ham-hill, Worcester.*
1864	Wodehouse, J. H., Esq., H.M.'s Commissioner and Consul-General for the Sandwich Islands.
1870	Wodehouse, His Excellency Sir Philip, K.C.B., Governor of Bombay. *Care of India-office, S.W.*
1866	*Wolff, Sir Henry Drummond, K.C.M.G., M.P. 15, *Rutland-gate, S.W.; and Athenæum Club, S.W.*
1873	Wonnacott, Jno., Esq., F.G.S. &c. 15, *Haddington-road, Stoke, Devonport.*
1872	Wood, Captain Alexander (Bombay Staff Corps). *Heath-lodge, Abbey-wood, Kent. S.E.; and* 14, *St. James's-square, S.W.*
1873	Wood, Chas. Malcolm, Esq. *Heath-lodge, Abbey Wood, Kent; and Junior Athenæum Club, S.W.*
1873	2950 Wood, Gilbert, Esq. *Percy-villa, Warren-road, Bexley-heath, Kent.*
1863	Wood, Henry, Esq. 10, *Cleveland-square, Hyde-park, W.*
1868	*Wood, Richard Henry, Esq., F.S.A. *Penrhos-house, Rugby.*
1874	Wood, Walter, Esq. 3, *Clarence-road, Finsbury-park, N.*
1857	Woodhead, Major H. J. Plumridge. 44, *Charing-cross, S.W.*

Year of Election.	
1867	Woodifield, Mathew, Esq., M.I.C.E. *General Colonial Manager, Cape Copper Mining Co., Namaqualand, Cape of Good Hope. 43, Ladbroke-grove-road, Notting-hill, W.*
1873	*Woodroffe, John W. Allen, Esq. 14, *Thurlow-road, Hampstead, N.W.*
1874	Woods, Rob. Carr, Esq. *Care of Messrs. King and Co., Cornhill, E.C.*
1862	Woods, Samuel, Esq. *Mickleham, near Dorking, Surrey.*
1864	Woolcott, George, Esq. 78, *Palace-gardens-terrace, Kensington, W.*
1863	2960*Worms, Baron George de. 17, *Park-crescent, Portland-place, W.*
1845	Worthington, Rev. James, D.D. 27, *John-street, Bedford-row, W.C.*
1856	Worthington, J. Hall, Esq. *Alton-hill, Oxton, near Birkenhead.*
1866	*Worthington, Richard, Esq. 7, *Champion-park, Denmark-hill, S.E.*
1866	Wotton, William G., Esq., M.D. 15, *Clement's-inn, W.C.*
1875	Wragge, Clement L., Esq. *Stafford-lodge, New Hampton, S.W.*
1875	Wray, Geo., Esq., F.Z.S. 36, *Chester-terrace, Regent's-park, N.W.*
1839	*Wyld, James, Esq. *Charing-cross, W.C.*
1863	Wylde, W. H., Esq. *Foreign-office, S.W.*
1875	Wynne, Rev. Edward, M.A. *Parkgate-vicarage, Rotherham.*
1875	2970Wyon, Allan, Esq. 2, *Langham-chambers, Portland-place, W.*
1875	*Wyon, Alfred B., Esq. 2, *Langham-chambers, Portland-place, W.*
1869	Yardley, Sir William. *Hadlow-park, Tunbridge, Kent.*
1854	Yeats, John, Esq., LL.D. 7, *Beaufort-square, Chepstow, Monmouth.*
1861	York, Most Rev. William Thomson, Archbishop of, F.R.S. *Bishopsthorpe, York.*
1859	Yorke, Lieut.-General Sir Charles, K.C.B. 19, *South-st., Grosvenor-square, W.*
1857	*Young, Allen, Esq. 1, *St. James's-street, S.W.*
1838	*Young, Charles Baring, Esq. 4, *Hyde-park-terrace, W.*
1874	*Young, Charles Edward Baring, Esq. 12, *Hyde-park-terrace, W.*
1830	*Young, James, Esq.
1858	2980Young, James, Esq. *Kelly, Wemyss Bay, by Greenock.*
1857	Yule, Colonel Henry, C.B., Bengal Engineers. *Messrs. Grindlay & Co., 55, Parliament-street, S.W.*
1864	2982Zwecker, J. B., Esq. 2, *Denmark-terrace, Brentford-road, W.*

NAMES OF INDIVIDUALS

TO WHOM

THE ROYAL PREMIUMS AND OTHER TESTIMONIALS HAVE BEEN AWARDED.

1832.—Mr. RICHARD LANDER—Royal Medal—for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin.

1833.—Mr. JOHN BISCOE—Royal Medal—for the discovery of the land now named "Enderby Land" and "Graham Land," in the Antarctic Ocean.

1834.—Captain Sir JOHN ROSS, R.N.—Royal Medal—for discovery in the Arctic Regions of America.

1835.—Sir ALEXANDER BURNES—Royal Medal—for the navigation of the River Indus, and a journey by Balkh and Bokhara across Central Asia.

1836.—Captain Sir GEORGE BACK, R.N.—Royal Medal—for the discovery of the Great Fish River, and its navigation to the sea on the Arctic Coast of America.

1837.—Captain ROBERT FITZROY, R.N.—Royal Medal—for the survey of the Shores of Patagonia, Chile, and Peru, in South America.

1838.—Colonel CHESNEY, R.A.—Royal Medal—for the general conduct of the "Euphrates Expedition" in 1835-6, and for accessions to the geography of Syria, Mesopotamia, and the Delta of Susiana.

1839.—Mr. THOMAS SIMPSON—Founder's Medal—for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.

Dr. EDWARD RÜPPELL—Patron's Medal—for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.

1840.—Col. H. C. RAWLINSON, E.I.C.—Founder's Medal—for his travels and researches in Susiana and Persian Kurdistán, and for the light thrown by him on the comparative geography of Western Asia.

Sir R. H. SCHOMBURGK—Patron's Medal—for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.

1841.—Lieut. RAPER, R.N.—Founder's Medal—for the publication of his work on 'Navigation and Nautical Astronomy.'

Lieut. JOHN WOOD, I.N.—Patron's Medal—for his survey of the Indus, and re-discovery of the source of the River Oxus.

1842.—Captain Sir JAMES CLARK ROSS, R.N.—Founder's Medal—for his discoveries in the Antarctic Ocean.

Rev. Dr. E. ROBINSON, of New York—Patron's Medal—for his work entitled 'Biblical Researches in Palestine.'

1843.—Mr. EDWARD JOHN EYRE—Founder's Medal—for his explorations in Australia.

Lieut. J. F. A. SYMONDS, R.E.—Patron's Medal—for his survey in Palestine, and levels across the country to the Dead Sea.

1844.—Mr. W. J. HAMILTON—Founder's Medal—for his researches in Asia Minor.

Prof. ADOLPH ERMAN—Patron's Medal—for his extensive geographical labours.

1845.—Dr. BEKE—Founder's Medal—for his extensive explorations in Abyssinia.

M. CHARLES RITTER—Patron's Medal—for his important geographical works.

1846.—Count P. E. DE STRZELECKI—Founder's Medal—for his explorations and discoveries in the South-Eastern portion of Australia, and in Van Diemen's Land.

Professor A. TH. MIDDENDORFF—Patron's Medal—for his extensive explorations and discoveries in Northern and Eastern Siberia.

1847.—Captain CHARLES STURT—Founder's Medal—for his various and extensive explorations in Australia.

Dr. LUDWIG LEICHHARDT—Patron's Medal—for a journey performed from Moreton Bay to Port Essington.

1848.—Sir JAMES BROOKE, Rajah of Saráwak and Governor of Labuan—Founder's Medal—for his expedition to Borneo.

Captain CHARLES WILKES, U.S.N.—Patron's Medal—for his Voyage of Discovery in the S. Hemisphere and in the Antarctic Regions, in the years 1838–42.

1849.—AUSTEN H. LAYARD, Esq., D.C.L. M.P.—Founder's Medal—for his contributions to Asiatic geography, researches in Mesopotamia, and discoveries of the remains of Nineveh.

Baron CH. HÜGEL—Patron's Medal—for his explorations of Cashmere and surrounding countries, communicated in his work entitled 'Kashmir und das Reich der Siek.'

1850.—Col. JOHN CH. FRÉMONT—Patron's Medal—for his successful explorations of the Rocky Mountains and California; and for his numerous Discoveries and Astronomical Observations.

The Rev. DAVID LIVINGSTONE, of Kolobeng—a Chronometer Watch—for his successful explorations of South Africa.

1851.— Dr. GEORGE WALLIN, of Finland—25 Guineas—for his Travels in Arabia.

Mr. THOMAS BRUNNER—25 Guineas—for his explorations in the Middle Island of New Zealand.

1852.—Dr. JOHN RAE—Founder's Medal—for his survey of Boothia and of the Coasts of Wollaston and Victoria Lands.

Captain HENRY STRACHEY—Patron's Medal—for his Surveys in Western Tibet.

1853.—Mr. FRANCIS GALTON—Founder's Medal—for his explorations in Southern Africa.

Commander E. A. INGLEFIELD, R.N.—Patron's Medal—for his Survey of the Coasts of Baffin Bay, Smith and Lancaster Sounds.

1854.—Rear-Admiral WILLIAM HENRY SMYTH—Founder's Medal—for his valuable Surveys in the Mediterranean.

Captain Robert J. M. M'CLURE, R.N.—Patron's Medal—for his discovery of the North-West Passage.

1855.—The Rev. DAVID LIVINGSTONE, M.D., &c.—Patron's Medal—for his Scientific Explorations in Central Africa.

Mr. CHARLES J. ANDERSSON—a Set of Surveying Instruments—for his Travels in South-Western Africa.

1856.—ELISHA KENT KANE, M.D.—Founder's Medal—for his discoveries in the Polar Regions.

HEINRICH BARTH, PHIL. DR.—Patron's Medal—for his explorations in Central Africa.

Corporal J. F. CHURCH, of the Royal Engineers—a Watch and Chain—for his scientific observations while attached to the Mission in Central Africa.

1857.—Mr. AUGUSTUS C. GREGORY—Founder's Medal—for his explorations in Western and Northern Australia.

Lieut.-Col. ANDREW SCOTT WAUGH, Bengal Engineers—Patron's Medal—for the Great Trigonometrical Survey of India.

1858.—Captain RICHARD COLLINSON, R.N.—Founder's Medal—for his Discoveries in the Arctic Regions.

1858.—Prof. ALEX. DALLAS BACHE, Superintendent U. S. Coast Survey—Patron's Medal—for his extensive Surveys of America.

1859.—Captain RICHARD F. BURTON—Founder's Medal—for his Explorations in Eastern Central Africa.

Captain JOHN PALLISER—Patron's Medal—for his explorations in British North America and the Rocky Mountains.

Mr. JOHN MACDOUALL STUART—a Gold Watch—for his Discoveries in South and Central Australia.

1860.—Lady FRANKLIN—Founder's Medal—in commemoration of the discoveries of Sir J. Franklin.

Captain Sir F. LEOPOLD MCCLINTOCK, R.N.—Patron's Medal—for his Discoveries in the Arctic Regions.

1861.—Captain JOHN HANNING SPEKE—Founder's Medal—for the Discovery of the Great Lake Victoria Nyanza, Eastern Africa, &c.

Mr. JOHN MACDOUALL STUART—Patron's Medal—for his Explorations in the Interior of Australia.

1862.—Mr. ROBERT O'HARA BURKE—Founder's Medal—for his Explorations in Australia.

Captain THOMAS BLAKISTON—Patron's Medal—for his survey of the River Yang-tsze-kiang.

Mr. JOHN KING—a Gold Watch—for his meritorious conduct while attached to the Expedition under Mr. R. O'Hara Burke.

1863.—Mr. FRANK T. GREGORY—Founder's Medal—for his explorations in Western Australia.

Mr. JOHN ARROWSMITH—Patron's Medal—for the very important services he has rendered to Geographical Science.

Mr. WILLIAM LANDSBOROUGH—a Gold Watch—for successful Explorations in Australia.

Mr. JOHN M'KINLAY—a Gold Watch—for successful Explorations in Australia.

Mr. FREDERICK WALKER—a Gold Watch—for successful Explorations in Australia.

1864.—Captain J. A. GRANT—Patron's Medal—for his journey from Zanzibar across Eastern Equatorial Africa to Egypt, in company with Captain Speke.

BARON C. VON DER DECKEN—Founder's Medal—for his two Geographical Surveys of the lofty Mountains of Kilima-njaro.

Rev. W. GIFFORD PALGRAVE—the sum of 25 Guineas—for the purchase of a Chronometer or other Testimonial, for his adventurous Journey in and across Arabia.

1865.—Captain F. G. MONTGOMERIE, R.E.—Founder's Medal—for his Trigonometrical Survey of North-West India.

Mr. S. W. BAKER—Patron's Medal—for his relief of Capts. Speke and

Grant, and his endeavour to complete the discoveries of those travellers.

Dr. A. Vámbéry—the sum of 40 Pounds—for his Travels in Central Asia.

1866.—Dr. Thomas Thomson, M.D.—Founder's Medal—for his Researches in the Western Himalayas and Thibet.

Mr. W. Chandless—Patron's Medal—for his Survey of the River Purûs.

M. P. B. du Chaillu—the sum of 100 Guineas—for his Astronomical Observations in the Interior of Western Equatorial Africa.

Moola Abdul Medjid—a Gold Watch—for his Explorations over the Pamir Steppe, &c.

1867.—Admiral Alexis Boutakoff—Founder's Medal—for being the first to launch and navigate ships in the Sea of Aral.

Dr. Isaac I. Hayes—Patron's Medal—for his memorable expedition in 1860-61 towards the open Polar Sea.

1868.—Dr. Augustus Petermann—Founder's Medal—for his zealous and enlightened services as a writer and cartographer in advancing Geographical Science.

Mr. Gerhard Rohlfs—Patron's Medal—for his extensive and important travels in the interior of Northern Africa.

The Pundit employed by Captain T. G. Montgomerie—a Gold Watch—for his route survey from Lake Mansarowar to Lhasa, in Great Thibet.

Educational Prize:—

Mr. John Wilson—the sum of Five Pounds—for successful competition in Geography at the Society of Arts examination.

1869.—Professor A. E. Nordenskiöld—Founder's Medal—for the leading part he took in the recent Swedish Expeditions in the North Polar Region.

Mrs. Mary Somerville—Patron's Medal—in recognition of the able works published by her, which have largely benefited Geographical Science.

Schools' Prize Medals:—

Political Geography.—Hy. G. Richmond, Liverpool College (Gold Medal).

Jas. Dearden Wilde, Manchester Grammar School (Bronze Medal).

Physical Geography.—Wm. Grundy, Rossall School (Gold Medal).

Geo. Wm. Gent, Rossall School (Bronze Medal).

Educational Prize:—

Mr. John Kidney—the sum of Five Pounds—for successful competition in Geography at the Society of Arts examination.

1870.—Lieutenant Fras. Garnier (of the French Imperial Navy)—Patron's Medal—for his survey of the course of the great Cambodian River during the years 1866–8.

Mr. George W. Hayward—Founder's Medal—For his explorations in Eastern Turkistan.

Schools' Prize Medals:—

Political Geography.—Geo. Wm. Gent, Rossall School (Gold Medal).

Jas. Hy. Collins, Liverpool College (Bronze Medal).

Physical Geography.—Geo. Grey Butler, Liverpool College (Gold Medal).

Martin Stewart, Rossall School (Bronze Medal).

Educational Prize:—

Mr. Thomas Richard Clarke—the sum of Five Pounds—for successful competition in Geography at the Society of Arts examination.

1871.—Sir Roderick I. Murchison, Bart.—Founder's Medal—in recognition

of the eminent services he has rendered to Geography during his long connection with the Society.

A. KEITH JOHNSTON, PH. DR.—Patron's Medal—for his long-continued and successful services in advancing Geography, and especially for his merit in carrying out his scheme of Physical Atlases.

SCHOOLS' PRIZE MEDALS:—

Political Geography.—GEO. HOGBEN, University School, Nottingham (Gold Medal).

RICHD. NAYLOR ARKLE, Liverpool College (Bronze Medal).

Physical Geography.—DANIEL MCALISTER, Liverpool Institute (Gold Medal).

WM. GERSHOM COLLINGWOOD, Liverpool College (Bronze Medal).

EDUCATIONAL PRIZE:—

Mr. JOHN ARMSTRONG—the sum of Five Pounds—for successful competition in Geography at the Society of Arts examination.

1872.—Colonel HY. YULE, C.B.—Founder's Medal—for the eminent services he has rendered to Geography in the publication of his three great works, 'A Mission to the Court of Ava,' 'Cathay, and the Way Thither,' and 'Marco Polo.'

Mr. ROBERT BERKELEY SHAW.—Patron's Medal—for his Journeys in Eastern Turkistan, and for his extensive series of Astronomical and Hypsometrical Observations, which have enabled us to fix the longitude of Yarkand, and have given us, for the first time, the basis of a new delineation of the countries between Leh and Kashgar.

Lieut. G. C. MUSTERS, R.N.—A Gold Watch—for his adventurous Journey in Patagonia, through 960 miles of latitude, of which 780 were previously unknown to Europeans.

KARL MAUCH—the sum of Twenty-five Pounds in acknowledgment of the zeal and ability with which he has devoted himself, for a series of years, to the Exploration of South-Eastern Africa.

SCHOOLS' PRIZE MEDALS:—

Physical Geography.—S. E. SPRING RICE, Eton College (Gold Medal).

A. S. BUTLER, Liverpool College (Bronze Medal).

Political Geography.—W. G. COLLINGWOOD, Liverpool College (Gold Medal).

W. C. GRAHAM, Eton College (Bronze Medal).

EDUCATIONAL PRIZE:—

Mr. GEO. M. THOMAS—the sum of Five Pounds—for successful competition in Geography at the Society of Arts Examination.

1873.—Mr. NEY ELIAS.—Founder's Medal—for his survey of the Yellow River of China, in 1868; and for his recent journey through Western Mongolia.

Mr. H. M. STANLEY.—Patron's Medal—for his discovery and relief of Dr. Livingstone.

Mr. THOMAS BAINES.—A Gold Watch—for his long-continued services to Geography, and especially for his journeys in South-Western and South-Eastern Africa.

Captain CARLSEN.—A Gold Watch—for his discoveries in the Arctic Seas, and for having circumnavigated the Spitzbergen as well as the Nova Zembla groups.

SCHOOLS' PRIZE MEDALS:—

Physical Geography.—W. C. HUDSON, Liverpool College (Gold Medal).

W. A. FORBES, Winchester College (Bronze Medal).

Political Geography.—S. E. SPRING RICE, Eton College (Gold Medal).

A. T. NUTT, University College School (Bronze Medal).

1874.—Dr. GEORG SCHWEINFURTH.—Founder's Medal—for his discovery of the Uelle River, beyond the South-western limits of the Nile basin; and for his admirable work, 'The Heart of Africa,' in which he has recorded the results of his travels.

Colonel P. EGERTON WARBURTON.—Patron's Medal—for his journey across the previously unknown Western Interior of Australia; from Alice Springs, on the line of overland telegraph, to the West Coast near De Grey River.

SCHOOLS' PRIZE MEDALS:—

Physical Geography.—LOUIS WESTON, City of London School (Gold Medal).

FRANCIS CHARLES MONTAGUE, University College School (Bronze Medal).

Political Geography.—WILLIAM HARRY TURTON, Clifton College, Bristol (Gold Medal).

LIONEL JACOB, City of London School (Bronze Medal).

1875.—Lieut. WEYPRECHT.—Founder's Medal—for his explorations and discoveries in the Arctic Sea between Spitzbergen and Nova Zembla.

Lieut. JULIUS PAYER.—Patron's Medal—for his journey and discoveries along the coast of Franz-Josef's Land, between Spitzbergen and Nova Zembla.

W. H. JOHNSON.—Gold Watch—for services rendered to Geography while engaged in the Great Trigonometrical Survey of India among the Himalayas.

SCHOOLS' PRIZE MEDALS:—

Physical Geography.—HENRY ALEXR. MIERS, Eton College (Gold Medal).

ARCHIBALD EDWD. GARROD, Marlborough College (Bronze Medal).

Political Geography.—SIDNEY H. B. SAUNDERS, Dulwich College (Gold Medal).

WM. C. GRAHAM, Eton College (Bronze Medal).

PRESENTATION

OF THE

ROYAL AND OTHER AWARDS.

(*At the Anniversary Meeting*, 24*th May*, 1875.)

ROYAL MEDALS.

THE Gold Medals entrusted to the Society for the encouragement of Geographical science and discovery were awarded this year as follows:—

The Founder's Medal to Lieutenant Weyprecht, of the Austrian Navy, for the enterprise and ability he has displayed in the command of two expeditions to the sea between Spitzbergen and Nova Zembla; for his discovery of new lands in the same sea; and for the numerous and valuable scientific observations made during his voyages.

The Patron's Medal to M. Julius Payer, for the great service he has rendered to Geography by his explorations and discoveries in the Arctic regions; first, as member of the North German Expedition of 1869–70, in East Greenland, and afterwards, as second in command to Lieutenant Weyprecht, in the two Austrian Expeditions to the Nova Zembla Sea of 1871 and 1872–4, during the latter of which he led the sledge-party in exploring the coasts of the newly-discovered Franz-Josef Land.

His Excellency the Count von Beust, Austro-Hungarian Ambassador, attended to receive the Medals in the absence of Lieutenant Weyprecht and M. Payer.

The PRESIDENT addressed Count von Beust as follows:—

"EXCELLENCY,

"In the unavoidable absence of the officers to whom the Royal Geographical Society has this year awarded its Medals, I am proud to be permitted to deliver them into the hands of a statesman

so well known and so universally respected throughout Europe as yourself. And I will venture to observe that the occasion is one which, from its very exceptional character, is the more worthily associated with your Excellency's name, since it is the first time during a long series of years that the Council of the Royal Geographical Society, weighing the claims of travellers in all parts of the world, has decided to award both its Medals to members of the same Expedition, that Expedition moreover led by Austrian officers and supported by the private munificence of Austrian subjects, not only bearing honourable testimony to the maritime enterprise of the nation which you so ably represent, but having also achieved the most important Geographical discovery of modern times. Lieutenant Weyprecht, of the Austrian Navy, and Lieutenant Payer, of the Austrian Military service, have been associated for several years past in Arctic exploration. Their first joint enterprise was in the year 1871, when, embarked in a small sailing-vessel of only 40 tons measurement, they extensively explored the sea between Spitzbergen and Nova Zembla, and actually reached the very high latitude of 79° N., bringing back to Europe such a favourable account of the navigability of this part of the Arctic Ocean, that the screw-steamer *Tegethoff* was fitted out in 1872 and sent to continue the exploration. It is this last Expedition—in which Lieutenant Weyprecht commanded and Lieutenant Payer led the sledge-parties on shore—that has mainly earned the Medals of our Society, granted for important services rendered to Geographical science; for not only was a new and extensive land discovered to the north-east of Spitzbergen, to which the name has been given of Franz-Josef Land, but under circumstances of extreme difficulty, owing to the imminent danger which threatened their ice-bound vessel, a series of scientific observations were made and recorded by the officers of the *Tegethoff* as valuable as any ever before obtained in an Arctic voyage. The greatest credit also is due to Lieutenant Weyprecht for his able and thoughtful management of the crew committed to his charge, for his maintenance of discipline, and his attention to the health and comfort of his men, during the two winters that his vessel remained imbedded in the ice; and, finally, for the resolution and skill with which, when the extrication of the *Tegethoff* from the ice was manifestly impossible, he abandoned the ship and succeeded, by means of boats and sledges, in conveying his party in safety to Nova Zembla.

"Lieutenant Payer was distinguished as an Alpine explorer

before he joined the North German Expedition to East Greenland in 1869. On that occasion, however, he gained fresh laurels, having led the sledge-parties from the *Germania* in the spring of 1870 beyond the 77° of north latitude, and having contributed two excellent chapters and portions of others to the account of the voyage which was published on the return of the Expedition to Europe. In 1871 he was again employed in the first Austrian Expedition to the Nova Zembla Sea, and ably seconded Lieutenant Weyprecht in that navigation, when they reached 79° N. before they were obstructed by the ice. Lieutenant Payer's great and crowning services, however, as an Arctic explorer have been rendered in connection with the recent voyage of the *Tegethoff*. During that voyage, in the early spring of 1874, and after being imprisoned for two winters in the ice, Lieutenant Payer landed on Franz-Josef Land, and commenced a sledge-journey of 17 days to the north, during which he not only laid down the outline of a large extent of hitherto unknown land, but he ultimately reached Cape Fligely, in 82° 5′, and from that elevated point, about 1500 feet high, he traced the coast-line as far as 83° N., where a remarkable headland, named Cape Vienna, formed the western extremity of a country which he called Petermann Land, after the famous geographer of Berlin. Lieutenant Payer subsequently rejoined his vessel 160 miles to the south in safety, and accompanied his commander on their return route to Europe.

"By general consent, this expedition conducted by Lieutenants Weyprecht and Payer is one of the most remarkable that has ever been made in the Arctic regions. It has especially attracted our admiration in this country as a noble instance of combined daring, skill, and endurance. We are further indebted in some degree to its successful termination for having stimulated our own Government to send forth the *Discovery* and *Alert*.

"We sincerely congratulate Austria on the achievements of her gallant children, and I request your Excellency, in presenting the Founder's Medal to Lieutenant Weyprecht and the Patron's Medal to Lieutenant Payer, to assure them that their English brethren hail them with cordiality and joy as worthy fellow-labourers in our common field of geographical discovery and research."

Count von Beust, in accepting the medals, said he fully appreciated the great honour which had been conferred upon him. He was most sensible of the kind and flattering terms which the

President had used, and his countrymen would be proud of such testimonials from so eminent a Society. He was equally grateful to the Society and to his countrymen: to the latter first, on account of the lustre they had added by their deeds to Austro-Hungary, and next, because it was to them he was indebted for the kind and friendly reception he had met with in this distinguished assembly. The medals were a substantial pledge of the appreciation which was felt in this country for the labours of his countrymen; and he was acting in accordance with the wishes of both his Government and his countrymen when he tendered their sincerest good wishes for the success of the brilliant and gallant Expedition which was so soon to set sail from these shores, to carry England's "Union Jack" and her brave sailors to the far north.

OTHER AWARDS.

A GOLD WATCH was presented to Mr. W. H. Johnson, in acknowledgment of the services rendered to Geography by his survey-journey in 1865 across the Kuen-Luen to Ilchi in Khotan, and for the aid subsequently rendered to Sir D. Forsyth's Expedition whilst resident at Ladāk.

Colonel T. G. Montgomerie, of the Trigonometrical Survey of India, attended to receive the watch on behalf of Mr. Johnson.

The PRESIDENT addressed Colonel Montgomerie as follows:—

"Sir, I have the honour to hand to you, as representing the Great Trigonometrical Survey of India, a Gold Watch, which has been awarded by the Council to Mr. W. H. Johnson, who was formerly attached to the Survey, for the great services which he has rendered to Geography—

"1stly. By his visit to Khotan in 1865, when he approximately fixed the position of that important city, and was the first Englishman who ever crossed the Kuen-Luen into the plains of Tartary.

"2ndly. By his constant efforts, in his position as Commissioner of Ladāk under the Maharaja of Cashmere, to promote independent exploration, and especially by the aid he afforded Sir D. Forsyth in the recent passage of his Mission viâ Leh to Yarkand and Kashgar.

"As Mr. Johnson began life as one of your own employés it will be gratifying to the Council if you will undertake to present him with this watch, as a mark of our appreciation of his services, and

if you will assure him of the lively interest we shall take in his future career on that extreme frontier of our Indian empire where his lot is cast."

Colonel MONTGOMERIE replied:—

"Sir Henry Rawlinson, Ladies, and Gentlemen:—I have much pleasure in receiving this watch for Mr. Johnson, knowing, as I do, how well he has deserved such an honour from this learned Society.

"I am proud to think that one of my assistants on the Survey of the Northern Frontier of India has been selected for such a testimonial, looking on it, as I do, as the meet reward for much hard work in purely geographical research among the upper valleys, peaks, and glaciers of the Himalayas. Such a recognition of his services is, at the same time, a compliment to the Trigonometrical Survey of India, to which he had formerly the honour to belong.

"I regret Mr. Johnson is not here in person, for I feel sure that he would have expressed his grateful thanks much better than I can for him. He is, however, unavoidably absent, having had to return to India.

"I know he will greatly value this recognition of his services, this token of his having done good work in the cause of Geography: he will thoroughly appreciate it, and will, I know, treasure it as an heir-loom.

"A surveyor and explorer from boyhood, nothing can gratify him more than such a mark of approval from this Society, which is chartered to decide upon all geographical questions.

"As a mountaineer, Mr. Johnson was always conspicuous: no height, no amount of snow or ice, were sufficient to deter him if an ascent was necessary; and the number of trigonometrical stations which he established at over 20,000 feet was quite extraordinary.

"Those who visit Ladāk—now a possible summer-trip from London—would be able to see one of the masonry platforms from Leh, the capital, which was erected by Mr. Johnson's survey party on a peak of the range opposite, and west of that town, at a height of 21,500 feet above the sea. With a telescope there is no difficulty in tracing the artificial arrangement of the stones, and until quite recently a flag-staff, which was erected over it, was also visible, but has since, I believe, been destroyed by lightning. Those who like to try the effects of such an altitude will find the regular Trigonometrical mark engraved on the centre stone of the pillar.

"The occasion of Mr. Johnson's ascending to 22,300 feet was owing to his inability to get at a valley in any other way, except by crossing a ridge which reached this altitude. He actually forced his way over, and was obliged to spend the night at nearly 22,000 feet above the sea, darkness having come on before he got any lower.

"I know this award will be an incentive to Mr. Johnson's farther exertions in all geographical matters, and as this watch is one that will keep good time, I trust that with it Mr. Johnson may himself have an opportunity of determining some further geographical problems for this Society.

"Again thanking you most heartily on behalf of Mr. Johnson for the honour you have conferred on him, I have only to add that I will do my best to see that it is conveyed to him as safely as possible, though it will be no very easy matter, as it cannot reach him till he has again crossed the Himalayas, and reached his distant residence in Ladāk, some 20 marches beyond that great range of mountains."

PUBLIC SCHOOLS' PRIZE MEDALS.

The Hon. G. C. BRODRICK, at the invitation of the President, addressed the Meeting on the subject of the Public Schools Prizes' Examination of the present year. He said the Special Subject for the year 1874-5 was China; General R. Strachey being Examiner in Physical, and Sir Rutherford Alcock Examiner in Political Geography. The award of the Examiners was as follows:—

PHYSICAL GEOGRAPHY. *Gold Medal.*—Henry Alexander Miers, Eton College. *Bronze Medal.*—Archibald Edward Garrod, Marlborough College. *Honourably Mentioned.*—C. A. Spring Rice, Eton College; H. Perrin, Clifton College; H. H. Hancock, Bristol Grammar School; W. D. Thomson, Clifton College; H. M. Platnauer, City of London School.

POLITICAL GEOGRAPHY. *Gold Medal.*—Sidney H. B. Saunders, Dulwich College. *Bronze Medal.*—William C. Graham, Eton College. *Honourably Mentioned.*—J. Vans Agnew, Marlborough College; W. M. H. Milner, Marlborough College; J. F. Heyes, Liverpool College; D. G. Crawford, Cheltenham College; T. Knox, Haileybury College; A. S. Moriarty, Brighton College.

This was the seventh year in which these examinations had been held, and it was a most gratifying fact that, although the average standard of attainment had not always been as high as could have been wished, there never had been wanting candidates worthy, in the opinion of the Examiners, to receive both the Gold and the Bronze medals in both divisions. At first sight, the total number of candidates (nineteen in each subject) might appear rather small; but he thought it was as great as could be expected, for boys at public schools were now almost distracted with the multiplicity of examinations, and nineteen would be considered a very respectable number of competitors for a college scholarship at either of the Universities. Nor should it be forgotten that the Special Subject chosen for the year required a good deal of preparation outside the groove of the ordinary school studies. It was very satisfactory to learn, as the Council had done, that so many of the successful candidates in previous examinations had distinguished themselves in other studies at the Universities and elsewhere; and he had always maintained that preparation for the general Geographical papers was as good an investment of time as a boy at a public school could make, whether for the Universities, the Army, or the Civil Service. So much could scarcely be said for the Special Subject each year, which, however, was the characteristic feature of the examinations, and he ventured to doubt whether any Geographer present, however eminent, would stand much chance in the competition, without devoting a great deal of time to special preparation, against the successful candidates of the year.

The Special Subject for next year was the Arctic Regions. The physical geography of the Arctic Regions had a great interest of its own, and Mr. Major had shown how much was to be said on the political geography in connection with the various migrations and settlements along the coast of Greenland. But this was not the only reason which had influenced the Council in the selection of the subject; for it was felt to be a natural and a wholesome thing for the young geographers of our public schools to be associated with the whole country in sympathetic interest in that expedition which was just about to leave our shores, so that they might follow the movements of Captain Nares and his comrades on their perilous voyage across the Polar Seas, and stand with them, in imagination at least, on that central point, 90° N. latitude and no longitude at all, where it was hoped and believed the new expedition would succeed in planting the British flag.

In presenting the Gold Medal for Physical Geography to Mr. H. A. Miers, the PRESIDENT said: "I am very happy to present you with the Gold Medal for Physical Geography. You have had one of the first physical geographers in the world for your examiner, General Strachey, and having attained the Gold Medal under his inspection is a very great honour indeed. I am happy to find that you have an hereditary connection with science: your grandfather's reputation as a Botanist is known all over the world, and I trust this will be an incentive to you to emulate that reputation."

Addressing Mr. Garrod, the PRESIDENT spoke these words:—"Allow me to present you with the Bronze Medal for Physical Geography which you have earned this year. I believe you also are connected with science, your brother being well known as a physiologist. I trust that that will be an incentive to you to further exertion in scientific studies in future."

Next addressing Mr. S. H. B. Saunders, the PRESIDENT said: "I am very glad to present you with this Gold Medal for Political Geography. Sir Rutherford Alcock, one of our Vice-Presidents, whose past official connection with China rendered him master of the Special Subject of the year, as far as Political Geography was concerned, was your Examiner, and it is a great honour for you that he reports most favourably of your work. I think that on a previous occasion also you were honourably mentioned, and it is very satisfactory now to find that you have obtained the Gold Medal as a reward of persevering in the same course."

Addressing Mr. Graham, the PRESIDENT said: "I present you with this Bronze Medal for Political Geography. I congratulate you on having obtained it. I congratulate Eton College also on again having come to the front, and sent to us a prizeman for both Political and Physical Geography. I say nothing in disparagement of the other schools, but it must be very satisfactory to all Etonians to find their old college coming to the front in this manner, and sending prizemen for the Geographical Medals."

The Ballot for the Council was then taken, and the result declared as follows (the names in Italics being those of the New Councillors, and those who change office):—

President: Major-General Sir H. C. Rawlinson, K.C.B., &c. *Vice-Presidents:* Sir Rutherford Alcock, K.C.B., &c.; Admiral Sir George Back, D.C.L.; Vice-Admiral Sir R. Collinson, C.B.; *Lord Cottesloe.* *Trustees:* Lord Houghton, D.C.L., F.R.S.; Sir Walter C. Trevelyan, Bart. *Secretaries:* Clements R. Markham, Esq., C.B., F.R.S.; R. H.

Major, Esq., F.S.A. *Foreign Secretary:* Lord Arthur Russell, M.P. *Councillors: John Ball, Esq.*, F.R.S.; *Sir T. Fowell Buxton, Bart.;* Sir George Campbell, K.C.S.I., M.P.; Captain F. J. O. Evans, R.N., C.B.; James Fergusson, Esq., F.R.S.; *Right Hon. Sir H. Bartle Frere*, K.C.B.; Vice-Admiral Sir William H. Hall, K.C.B.; Major-General Sir Frederic J. Goldsmid, K.C.S.I.; *Francis Galton, Esq.*, F.R.S.; M. E. Grant-Duff, Esq., M.P.; *The Duke of Manchester;* John Murray, Esq.; Sir Charles Nicholson, Bart., D.C.L.; Vice-Admiral E. Ommanney, C.B., F.R.S.; General C. P. Rigby; *Admiral G. H. Richards*, C.B., F.R.S.; H. Danby Seymour, Esq.; S. W. Silver, Esq.; *General R. Strachey*, F.R.S.; Sir Harry C. Verney, Bart.; Major C. W. Wilson, R.E. *Treasurer:* Reginald T. Cocks, Esq.

The PRESIDENT announced, further, that the Council had that day elected His Royal Highness the Duke of Edinburgh as Honorary President of the Society, His Royal Highness having expressed his willingness to accept that office, and stated that he should be very happy to attend the meetings of the Society from time to time, and take the chair, on occasions when subjects were discussed which concerned the profession with which he was connected. His Royal Highness would not, as Honorary President, belong to the Council, but would occupy a position next to Her Majesty, the Patron, and the Prince of Wales, the Vice-Patron, of the Society.

The Annual Address on the progress of Geography was then read by the President, after which

Sir G. BOWEN rose to propose a vote of thanks to the President for his exceedingly able and lucid address. It was, he said, personally a great satisfaction to him to return to England after sixteen years' absence, and find the chair which was then so ably filled by Sir Roderick Murchison now occupied by Sir H. Rawlinson. He was quite sure that the meeting would join with him in expressing a hope that Sir Henry would permit his Address to be printed and circulated among the members of the Society.

Lord COTTESLOE, in seconding the resolution, said he had had more experience than many members present of the services rendered to the Society by the President, having been himself for some years a member of the Council, and the meeting having that day elected him one of the Vice-Presidents. He was able, therefore, to assure the members of the zeal, ability, and wisdom with which Sir Henry Rawlinson transacted the business of the Society.

The Resolution was agreed to.

The PRESIDENT in returning thanks for the vote, said he should do his best during the coming year to conduct the business of the Society as it had hitherto been conducted; but he trusted that at the next anniversary, as he should then have filled the chair for five years, he would be allowed to resign his position into the hands of some younger and more active officer. He had expressed a hope last year that Sir Bartle Frere would resume the chair on the present occasion, and he should still have expressed the same hope, but that in a short time Sir Bartle would leave England for some months, as he had arranged to accompany the Prince of Wales to India, so that it was impossible for him to perform the duties of President this year. He had merely retired from the office of Vice-President in consequence of that engagement, but on his return from India it was to be hoped that he would again resume the high office in the Society which he had formerly held.

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 24th May, 1875.

BY MAJOR-GENERAL SIR H. C. RAWLINSON, K.C.B., F.R.S., D.C.L., LL.D., ETC., PRESIDENT.

GENTLEMEN,

IN meeting you again on this, the 45th anniversary of the Royal Geographical Society, I am happy to be able to congratulate you on our increased and ever-increasing prosperity. You will have learnt from the Report of the Council, which has just been read, that during the past twelve months there has been a net increase of 200 Members, which is the largest addition that has been ever made to our ranks within the limits of the same period; for although last year there were 342 new paying Members, against 295 of the present year, there were also 177 withdrawals, as against 95, so that the balance is 23 in favour of the year now reported on. Our Register now exhibits the imposing total of 3035 Fellows, of whom 2960 are Ordinary, and 75 are Honorary, and Honorary Corresponding, Members. Our income has also steadily advanced until it now exceeds 7000*l.* per annum, and if we may judge from the repeated references that are made to us on Geographical subjects from all parts of the world, our reputation and influence have certainly not diminished. It must indeed be a gratifying reflection to the Fellows of this Society that it is mainly owing to the urgent and persistent arguments impressed by your successive Presidents on Her Majesty's Government, and supported by the full weight of your unanimous approval, that the great national undertaking of a Polar Expedition has been at length accomplished. The Council do not take any especial credit to themselves for the success which has thus attended their efforts; but they do feel proud, as your

representatives, in having contributed to launch an enterprise which, as they believe, will not only yield the most valuable scientific results, but will redound to the honour of England, and will raise still higher the professional character of British sailors.

There are two other points to which I am desirous of calling your attention before proceeding to our regular Report on the progress of Geography. The one relates to our Evening Meetings, which we are still enabled, through the indulgent consideration of the Senate of the University of London, to hold in this handsome and commodious Hall. On all ordinary occasions the accommodation which is here furnished is ample for our requirements, and the Council would not therefore propose to cancel the rule which permits each Fellow to introduce one gentleman or two lady friends to our Evening Meetings; but on extraordinary occasions the demand for places is so great, that in the interests of the Fellows generally we are obliged to ask for authority to limit, at our discretion, the privilege of admission to such meetings to one visitor to each Member. The Council will not impose this restriction unless they have reason to apprehend excessive crowding; but it is manifestly unfair that the Hall should be filled with visitors to the exclusion of the Fellows, and we trust, therefore, that the compromise now suggested will meet with general approval.

The other point to which I desire to call your attention, and which has, I am sure, given much satisfaction to the Fellows, is the improvement in the publication of our 'Proceedings.' By great assiduity on the part of our Staff, and especially through the activity of our Secretary, Mr. Bates, we have been able before the Anniversary to present the Fellows with five numbers of our 'Proceedings' for the current Session, instead of three numbers, as in former years; not only a larger amount of matter, in an improved form, being thus submitted for perusal, but the further advantage being gained of circulating detailed information of new discoveries among the Fellows while the interest of the subject is still fresh in their memories. The 45th volume of the 'Journal' is also in active preparation, and will probably be finished before the end of the year, the material being of a very varied character, and amply sustaining the reputation which our publications have long enjoyed of furnishing the most complete record of the present state and progress of Geographical knowledge that is to be found in Europe.

Our losses by death during the period under review have been exceedingly heavy, the obituary list commencing with the honoured

names of Sir C. Lyell, D'Avezac, and Sir H. Kellett, and closing within these few days with the names of Mr. Findlay and Admiral Sherard Osborn, who, beloved and respected in this Society, were also among the foremost Geographers of the age.

Rear-Admiral Sherard Osborn, c.b.—In Sherard Osborn the Society has lost one of its most active and valued members. Devoted to his profession, an ardent geographer, an open-handed yet judicious encourager of enterprise, his bright and genial face will long be missed, and his place among us will not easily be filled. In the half-century that Osborn lived he did his full share of valuable work; and although he turned his hand to many things, yet there was a thoroughness and completeness in all he did which is rarely found combined with that versatility of genius which distinguished our lamented friend. Gifted with rare abilities, capable alike of conceiving great projects and of close and searching attention to minute details, endowed with warm sympathies and with an unusual power of attracting the devoted affection of those with whom he worked, he, through life, brought all the powers of his mind to bear on one object, which he sought in many ways. He loved his profession with a pure and unselfish devotion, and he saw how closely the best interests of the Navy were connected with the objects of this Society. Hence it was his perception of what was most conducive to the good of the Navy that led him to become an ardent geographer. He saw that in time of peace, exploration and discovery were the legitimate substitutes for warlike enterprises; and it was in his successful enforcement of this truth that his greatest service to his country lies. The story of Osborn's life thus furnishes a bright example of devotion to a noble profession, and of zealous and successful efforts to advance its true interests; on the one hand, by improving every branch of the Navy as a power in time of war, on the other by furthering geographical research, and advancing those great geographical and commercial enterprises which Osborn looked upon as the legitimate battles and victories of the Navy in time of peace.

Sherard Osborn was the son of a Colonel in the Madras Army, and was born on the 25th of April, 1822. In September 1837, at the age of fifteen, he entered the Navy as a first-class volunteer on board H.M.S. *Hyacinth*, an 18-gun corvette, commanded by Captain Warren, who gave him the nomination. After visiting Bombay and Trincomalee, the *Hyacinth* arrived at Singapore in May 1838,

and was employed to drive the insurgent Malays out of Quedah, a port on the Malacca peninsula, which it was the British policy to restore to the King of Siam. She left Penang in September 1838, in order to blockade Quedah and the River Parlis. For this purpose Captain Warren, besides his own ship, had three lugger-rigged gunboats, manned by Malays; and the command of one of these, called the *Emerald*, was entrusted to young Osborn. Thus, as a midshipman, and when only sixteen, Sherard Osborn took command of his first ship on December 8th, 1838. "All was bright and beautiful to me," he says. "Placed, young as I was, in a position of trust and responsibility, enjoying all the sweets of command and still too young to feel its anxieties, it was indeed the sunny side of the world that I was then enjoying, and as, with a throbbing pulse and zealous heart, I walked my own quarter-deck, how earnest, in all the honesty of youth, were my resolutions to deserve well of my profession." Then followed an exciting time, chasing and capturing piratical *prahus*, service on shore and up rivers, and some hard fighting, until Quedah was evacuated in the following March. At last the time came for giving up his independent command and returning to the *Hyacinth*. "It was not without regret," Osborn tells us, "that I bid my crew good-bye; for my first essay as a captain had been a very very happy one; and if ever a set of poor fellows tried to show that the feeling was mutual, it was exhibited in the warm good-bye of Jadee and his swarthy crew." Osborn kept a careful journal, noting down all he saw, read, or felt, and in 1857 the portion of it relating to the Quedah campaign was published, with a dedication to his beloved old commander, Captain W. Warren, C.B. It is one of the most charming naval stories of this century, full of tales of adventure and of information conveyed in a pleasant and genial form, and has been the delight of many a young officer who has learnt from 'Quedah' the importance of keeping a journal. Osborn always said that to a steady habit of journalising, noting down all he saw, and educating himself with his journal, he was mainly indebted for being able to fight his way up an arduous profession.

After the Quedah service the *Hyacinth* went to China, and Osborn was in her at the reduction of Canton in 1841. In 1842 he joined the *Clio*, commanded by Captain Troubridge, with whom he served on shore at the capture of the batteries of Woosung on the 16th of June. He was afterwards in the *Volage*, and returned home in the *Columbine* in 1843.

On the 6th of December, 1843, he passed his examination for Lieutenant, and was appointed to the *Excellent*, at Portsmouth, where he was a messmate of several of the gallant young officers who afterwards joined Sir John Franklin's Expedition, and whom he had previously known in China. After studying gunnery for a year, he passed out early in 1844 with a first-class certificate as gunnery officer, and was specially selected as Gunnery Mate of H.M.S. *Collingwood*, an 80-gun line-of-battle ship, which was commissioned as Flag-ship in the Pacific on May 4th, 1844.

The *Collingwood* bore the flag of Admiral Sir George Seymour, and was, in her day, the smartest as well as the happiest ship in the service. Her Captain was the late Admiral Sir Robert Smart, her Commander was the present Admiral H. Broadhead; and it is a remarkable fact that no less than five naval squadrons are at this moment commanded by old *Collingwoods*, namely, the Channel, the East Indian, the Pacific, the Australian, and the Flying Squadrons. Sherard Osborn brought the gunnery-drill of the *Collingwood*, both as regards general quarters and small-arm practice on shore, to a very high degree of efficiency, serving as Mate until his promotion on May 4th, 1846, and afterwards as Gunnery Lieutenant until the ship was paid off on July 20th, 1848. In the *Collingwood* Osborn visited most of the ports on the west coasts of South America, Mexico, and California, and the Society and Sandwich Islands; and he was especially fascinated by the grandeur of the river systems of South America, as future fluvial highways of commerce. He collected and wrote much on this subject; and it is very interesting, as instancing the completeness of all his life-work, that in after years, as one of the Directors of the Amazon Steam Navigation Company, he should have been able to realise one of the dreams of his youth.

After the *Collingwood* was paid off, Osborn was appointed to command the small screw-steamer *Dwarf*, for service on the coast of Ireland during the Smith O'Brien riots, and received great praise for his gallantry and seamanship in saving her when in a sinking state, after a heavy gale of wind. But on the return of Sir James Ross in the autumn of 1849, the fate of Sir John Franklin's Expedition, in which were many of his own friends and messmates, absorbed all his attention, and aroused his enthusiasm to the utmost. For it was proposed, and in very influential quarters, that the search for the *Erebus* and *Terror* should be abandoned, it being suggested that these ships had never entered Lancaster Sound, but had gone

down in Baffin Bay. Osborn hotly opposed this advice with all the energy of his character, repelling the arguments of those who wished to abandon Franklin to his fate with scornful indignation. He aroused the country, and before the close of 1849 the Government had resolved to renew the search.

The Arctic Expedition of 1850–51, under Captain H. T. Austin, C.B., consisted of two sailing-vessels, the *Resolute* and *Assistance*, and two steam-tenders; and Osborn received the command of the steamer *Pioneer*, as tender to Captain Austin's ship, the *Resolute*. This Expedition, taken as a whole, and considering its various results, was the most successful and important that ever entered the Arctic regions. Captain Austin's arrangements for winter-quarters, and the system he introduced, secured not only the health but the cheerfulness and happiness of officers and men. There was no sickness, and the only death was due to an accident. M'Clintock, who had the experience of Sir James Ross's Expedition to aid him, developed the system of sledge-travelling under Austin, and brought it to great perfection, so that many hundreds of miles were explored. Osborn showed the importance of steam-power in the ice, and his exploits in Melville Bay led directly to the adoption of powerful screw-steamers for the whaling fleet. This was his special part of the work; but he was one of the leading spirits of the expedition, and accompanied Captain Ommanney in the journey across the frozen sea to Cape Walker, and onwards, in independent command, to the western extreme of Prince of Wales Land. Fifteen sledges, manned by 105 officers and men, were equipped for the search, and nobly did they all do their work. But Osborn gives the chief credit to the men. "On them fell the hard labour, to us fell the honours of the enterprise; yet none excelled the men in cheerfulness and sanguine hopefulness." Of the officers, "M'Clintock," says Osborn, "had fairly won the palm; in eighty days he had travelled 800 miles, and heartily did all congratulate him on his success."

On the return of Captain Austin's Expedition in the autumn of 1851, Osborn again pleaded earnestly for a renewal of the search. Until the fate of Franklin and his people was discovered, and the records brought home, and not till then, Osborn again and again declared, would England have done her duty towards the captains, officers, and crews of H.M.S. *Erebus* and *Terror*. The publication of his 'Stray Leaves from an Arctic Journal,' in February 1852, which contains an admirable account of ice-navigation in Melville Bay, of Arctic winter-quarters, and of Arctic sledge-travelling, stimulated

public interest, and early in 1852 the dispatch of another expedition was decided upon. Osborn again commanded the *Pioneer*, having been promoted to the rank of Commander; and, owing to his previous experience, his presence in the expedition was invaluable. He passed two most trying winters up Wellington Channel, and made long sledge-journeys, one of which, exceeding a thousand miles, on foot. Returning home in the autumn of 1855, he for a few months was Commander of the Norfolk District Coast Guard, an appointment he accepted to recruit his health. He had been for five summers and three winters in the Arctic regions, a service which he ever looked upon as an invaluable training for a naval officer, and from the day of his return he contemplated the renewal of scientific Arctic research at some future day. During the brief interval of rest he undertook the difficult task of editing the journals of Sir Robert M'Clure, and in April 1856 was published, 'The Discovery of a North-West Passage by H.M.S. *Investigator*, Captain R. M'Clure, edited by Captain Sherard Osborn,' which has since passed through four editions.

The Crimean war had broken out before the return of the Arctic Expedition, and Sherard Osborn was soon called from his brief rest to active service. He was appointed to H.M.S. *Vesuvius* in the Black Sea, and assisted Admiral Boxer in restoring order in Balaklava Harbour. He was present at the capture of Kertch, and in the spring of 1855 he succeeded Captain Lyons in command of a light squadron, of fourteen to eighteen gunboats and dispatch vessels in the Sea of Azov, the shores of which were lined with extensive depôts of provisions for the supply of Sebastopol. With extraordinary dash and celerity Osborn attacked position after position, and destroyed the accumulated stores at Berdiansk, Taganrog, Gheisk, and Arabat. During the campaign of 1855 he was promoted to post-rank, and, at the special request of Sir Edmond Lyons, was appointed to the *Medusa*, in which vessel he continued to command the Sea of Azov squadron until the signature of the treaty of peace. In this remarkable service Sherard Osborn displayed great powers of organization, combined with dash and rapidity of action. In recognition of its value he was created a Companion of the Order of the Bath, an officer of the Legion of Honour, and of the Medjidje.

It was at this time, in 1856, that Sherard Osborn became a Fellow of the Royal Geographical Society, just nineteen years ago, and in 1857 he contributed a paper 'On the Geography of the

Sea of Azov, the Putrid Sea, and the adjacent Coasts, with Remarks on their Commercial Future,' which was published in the twenty-seventh volume of our 'Journal.'

In the spring of 1857 Captain Osborn was appointed to H.M.S. *Furious*, on the breaking out of the war with China, and he was entrusted with the responsible duty of escorting fifteen gunboats to China, some of them of the lightest draught that had ever passed the Cape. Sir William Palmer, the Commander-in-Chief at Devonport, was so much struck with the arduous nature of the task that, in giving Captain Osborn his parting orders, he said, in the presence of his Secretary, Mr. Charles Richards, "If you ever, Sir, deliver all that squadron safe to your Admiral in China, you deserve to be made a Commodore." By carrying the squadron on a great circle to the south of the Cape the passage was made without a single disaster; the gunboats arrived safely at Hong-Kong, and their presence changed the character of the war, and brought our negotiations to a successful issue. Captain Osborn took a prominent part in all the operations of the war, from the escalade of Canton to the capture of the Taku Forts in 1858, and he was the first to reach the city of Tien-tsin. He afterwards took Lord Elgin to Japan, and led the squadron beyond the surveyed portion of Yedo Bay, until the ships were anchored within gunshot of the capital; which secured the signature of a satisfactory treaty between Great Britain and Japan.

In September 1858 the question arose as to how far it was possible to declare the River Yang-tsze navigable for Europeans, and Captain Osborn undertook to test it by taking the *Furious*, accompanied by the *Cruiser* and two gunboats, up the river as far as she would go. The river was falling, and the navigation was most intricate and difficult. Several times the *Furious* had to be cleared to her keel, in order to float her off unknown reefs and shoals; but he succeeded in reaching Hankow, 600 miles from the sea. The service was a most important one, for it enabled Lord Elgin to insist on the river being opened to foreign commerce; and at this moment there is a line of steamers on it carrying a valuable European trade. The Ambassador spoke of the transport of the *Furious* to Hankow as a feat unparalleled in naval history, and added that the successful issue of the undertaking was due "to the energy, professional skill, courage, and judgment, of Captain Osborn and his able Master," Mr. Stephen Court, another old Arctic officer, who had served with distinction in the *Investigator* under Sir Robert M'Clure.

In 1859 Sherard Osborn returned to England in shattered health, and worked hard to support his family by literary labours. He published his 'Cruise in Japanese Waters,' 'The Fight on the Peiho,' 'On Allied Operations in China,' 'Our Position with China,' 'War and Progress in China,' and 'A Cruise in the Yangtsze,' as articles in 'Blackwood's Magazine' in 1859 and 1860. In the same periodical he also published 'The Voyage of the *Fox* in the Arctic Seas,' in January 1860; 'Iron Clad Ships of War,' in November and December 1860, and March 1861; 'The Transatlantic Telegraph Iceland Route,' in February 1861; and 'The Physical Geography of the Sea,' in March 1861. It was in December 1859, also, that he published his charming memoir of the illustrious Arctic navigator for whose succour he had devoted the best years of his own life. 'The Career, Last Voyage, and Fate of Sir John Franklin,' was one of Sherard Osborn's noblest literary efforts. At this period, also, Osborn contributed two papers to our 'Proceedings,' namely, 'Remarks upon the Amount of Light experienced in High Northern Latitudes during the Absence of the Sun,' and 'Notes Geographical and Commercial made during the Passage of H.M.S. *Furious* in 1858 from Shanghai to the Gulf of Pecheli and back.'

In 1861 Captain Osborn was appointed to H.M.S. *Donegal*, and served on the coast of Mexico until the following year, when the *Donegal* was paid off. In June 1862 a proposal was made to Sherard Osborn by Mr. Lay, as agent to the Chinese Government, that he should take command of a large squadron of armed vessels to be equipped by him in England for the suppression of piracy on the coast of China, on the understanding that he would not be placed under any native authorities, but receive his orders direct from the Emperor. A squadron of six vessels was constructed, equipped, and carried to the neighbourhood of Peking in 1863, with Osborn in supreme command, and Charles Forbes, Burgoyne, Allen Young, and Spencer Chapman under him. But, on reporting himself, Osborn found that the Chinese Government repudiated the engagements of its agent, and wished to place a mandarin as a superior officer over him; and he found also that the altered conditions were likely to cause embarrassment to his own Government. On the one hand, he still had the opportunity of making a large fortune in a perfectly legitimate way; on the other, he saw that his continuance in command might prove compromising to British interests in China. He took a truly patriotic course,—sacrificed

private considerations to the interests of his country, and withdrew the whole force. For this unselfish decision* he received the warmest official commendation, and the cordial personal thanks of Lord Palmerston. But anyone who knew Osborn could have no doubt of his course of action under such circumstances. Devotion to his profession and love of country were the ruling passions of his life.

At this time Captain Cowper Coles was urging his turret system, which he had first conceived while serving under Sherard Osborn in the Sea of Azov, on the attention of the Admiralty. In developing his ideas Captain Coles had always received cordial encouragement from Osborn; and in 1864 Captain Osborn was appointed to H.M.S. *Royal Sovereign*, an old line-of-battle ship which had been cut down and specially adapted to test the new turret system invented by Cowper Coles. Osborn held this command until the end of 1864, and reported on the perfect success with which 12-ton guns were for the first time used at sea, and generally on the excellence of the turret system.

It was during this period of home service that Osborn at length found time to turn his attention to a renewal of Arctic discovery. He was perfect master of his subject, and had read and carefully weighed all that had been done and written on Arctic matters, both before and since his own return from the far north in 1845. He knew that if the unknown region round the Pole was to be discovered and explored, it must be by that system of sledge-travelling which was developed in Captain Austin's Expedition by Sir Leopold M'Clintock. Consequently the route to be selected must be that which, while offering the greatest facilities for retreat, also furnished the means of travelling along a continuous coast-line running northwards. In his memorable paper, read before the Geographical Society on January 23rd, 1865, Sherard Osborn eloquently advocated the dispatch of a naval Arctic Expedition to explore the unknown Polar region by the route of Smith Sound, and consisting of two vessels. Never was there so large and enthusiastic a gathering of Arctic officers and men of science; and it was felt that, in spite of delays and sneers and divided counsels, Osborn's proposal would eventually be adopted. He had on his side complete knowledge, judgment, tact, untiring energy, and perseverance. In his youth Osborn was impetuous, and was occasionally hurried by his zeal into writing or saying things which created opposition. But in his mature years this impetuosity was kept well in hand,

and became a useful servant to aid in the achievement of great ends. The subject was thoroughly ventilated in 1865; articles were written in leading periodicals, and the public became accustomed to its discussion; Osborn was satisfied with this result for the moment, and bided his time.

His great talent for organisation led to his being offered and to his accepting the appointment of Agent to the Great Indian Peninsula Railway, and he sailed for Bombay in March 1865. During the following year he devoted his whole energies to the improvement of arrangements for the traffic, and especially for the transport and shipment of cotton bales, and he effected great and extensive reforms. When, in April 1866, he was obliged to resign his appointment and return to England, owing to ill health, the Government of Bombay expressed "very sincere regret at the prospect of the loss of his services, which have been most valuable to the Government and to the public." In 1867 he became Managing Director of the Telegraph Construction and Maintenance Company, for the purpose of giving his professional knowledge to the work of establishing submarine telegraph communication between Great Britain and her Eastern and Australian possessions. In four years this undertaking was completed by a series of submarine cables from Falmouth, the Mediterranean and Red Sea, to India, China, and Australia. Sherard Osborn, in completing this great work, served the commercial as well as the naval and military interests of his country; and when he read his paper at our Meeting on November 29th, 1870, 'On the Geography of the Bed of the Atlantic, Indian Ocean, and Mediterranean Sea,' he announced that during the two previous years his Company had laid 17,000 miles of cable, worth 6,000,000*l.* He continued to preside over the work of the Telegraph Maintenance Company from 1867 to 1873.

In 1868 Sherard Osborn contested Birkenhead in the Liberal interest, and fought a gallant battle against the overpowering local influence of Messrs. Laird. His failure was an undoubted loss to the House of Commons and to the country. He had a most agreeable voice, great powers of diction, and a ready fluency, which, added to his extensive and varied knowledge, and his aptitude as an administrator and organiser of work, would have ensured to him Parliamentary and official success. In 1871 he had command of H.M.S. *Hercules* in the Channel squadron for some months, and on the 29th of May, 1873, he was promoted to the rank of Rear-Admiral. In 1867 he published two articles in 'Blackwood's Magazine' on

'Our Naval Defences' and on 'The Turret-ships of England and America;' and in 1873 he brought out a thoughtful and most valuable pamphlet on coast defences.

Ever zealous for the advancement of the objects of this Society, and desirous of giving some lasting mark of his sense of the use that our library had often been to him in his researches, he quite recently presented the Council with the sum of 200*l.*, to be laid out in the purchase of valuable works. He did not intend that the name of the giver should become known, but his death removes all necessity for concealment, and it is right that the Fellows should know to whom we are indebted for this munificent gift.

After preparing the way by repeated recurrence to the subject in periodicals, Sherard Osborn read his second paper, 'On the Renewal of Arctic Exploration,' at a meeting of our Society in January 1872. He maintained the same views as he had propounded in 1865, and again urged the value and importance of such expeditions as a school for training naval officers, and as a noble and useful occupation in time of peace. The interval had been well spent, and it was found that all Arctic authorities were now unanimously in favour of Sherard Osborn's route by Smith Sound. It was clear that the public mind was moved, and that it only remained to convince the Government that such was the case. During 1872 an exhaustive Memorandum on the scientific results to be obtained by Arctic exploration was prepared, the greater part of which was written by Osborn; and in December he accompanied our deputation to Mr. Lowe and Mr. Goschen, and took a leading part in the representations that were made. But the result was unsatisfactory.

Sherard Osborn found that the obstacle was the official objection, based on the alleged difficulties and danger of ice-navigation. He therefore became convinced that this objection must be removed, and that the only practical way of getting rid of it was to dispatch a naval officer to the Arctic regions to give a lively and fresh report on ice-navigation and on the modern system of overcoming obstacles to progress in the ice. He selected for this service Commander A. H. Markham, who, under Admiral Osborn's auspices, visited Baffin Bay, Barrow Strait, and the Gulf of Boothia in a whaler, acquired a thorough knowledge of ice-navigation with the aid of steam, and returned in perfect safety. The results of his observations were published in a work, entitled 'A Whaling Cruise to Baffin Bay, in 1873,' to which Sherard Osborn wrote an introduction. Strengthened with this additional evidence, I and the Presi-

dent of the Royal Society, accompanied by Admiral Sherard Osborn, had an interview with the Prime Minister on August 1st, 1874, the result of which is well known. An Arctic Expedition was decided upon, and in December of last year a Committee, consisting of Admirals Richards, M'Clintock, and Sherard Osborn, was appointed by the Admiralty to arrange all the details, and to recommend the instructions that should be given to the leader of the Expedition. Their arduous labours were completed last March; and thus, after ten years, the efforts of Sherard Osborn to secure the dispatch of an Expedition to discover and explore the unknown region round the Pole were at length crowned with success.

The loss of our lamented Associate at such a moment is peculiarly sad. On Monday, the 3rd of May, he went to Portsmouth, and was constantly on board the *Alert* and *Discovery* during the two following days, making the acquaintance of the younger officers, offering useful suggestions, and doing many acts of thoughtful kindness. On the 5th, he returned to London; and he died very suddenly, and without any warning of illness, on the evening of the 6th of May. His remains were interred in the Highgate Cemetery on Monday the 10th, the very day on which we all looked forward to hearing his cheery voice in this room. I and the Secretary of our Society were among the numerous old friends who followed him to his last resting-place. Many comrades in the Arctic regions stood round his grave:—Sir Leopold M'Clintock, Admiral Richards, Captain Allen, Mr. Clements Markham, Dr. Lyall, Dr. Pickthorn, Mr. Allen Young, and Mr. John Barrow, the long-tried friend of all Arctic voyagers. The Expedition which is about to sail was represented by Captain Nares, Captain Stephenson, Commander A. H. Markham, and Lieutenants Giffard, Parr, Rawson, and Egerton. Of old *Collingwoods* there were Admiral Rowley Lambert, and Mr. Clements Markham; and of other old friends and messmates—Sir John Hay, Captains Mayne, Seymour, Davidson, Forbes, Mr. Spencer Chapman, and Colonel Jenkin Jones, were present.

Sherard Osborn had just reached the age of fifty-three. Few men have completed so much work of lasting and permanent value in so short a space of time. His loss will be long and deeply felt in the public service, by the Fellows and Council of this Society, and by a wide circle of friends. It is a sad commencement for the Arctic Expedition. But it should not and will not cast gloom over it. Sherard Osborn has been called away after having done his work bravely and manfully in this world. A truer sailor, a braver

officer, a kinder and more warm-hearted friend, never breathed. He leaves behind him a bright example to follow, and that example will strengthen the resolves of the young Arctic officers to deserve the praise which he would have given them with no sparing hand, and to do honour to that noble profession which Sherard Osborn loved so well.

Alexander George Findlay.—A name known wherever the flag of the British Marine has floated, is placed in the list of our losses during the Session just drawing to a close. Mr. Findlay's connection with this Society dates from the year 1844, and during the last nineteen years, with two short intervals, he had been an active and much-esteemed Member of its Council and Committees. He was born in London, January 6th, 1812; his physique during his life, which was never equal to his mental powers, became gradually impaired as the latter ripened, and he died at Dover on the 3rd of the present month, in his 64th year, the event being precipitated by the loss of his wife a few weeks previously.

Mr. Findlay's younger days were occupied in the compilation of Geographical and Hydrographical works, of which his Atlases of Ancient and Comparative Geography are best known to the public. But he did not confine himself to one department of geographical work, his talents soon finding scope in supplying the wants of a class whose literature is to the landsman a sealed book; and by the death of John Purdy, the Hydrographer, in 1843, he was placed in the position of successor to this branch of nautical research and authorship. One of his first works of real importance to the maritime world was the exhaustive 'Directory for the Navigation of the Pacific Ocean,' comprising 1400 pages. This was published in 1851, and for its production he was highly complimented in different quarters, and especially by our former President, Sir Roderick Murchison. Years of intense labour and application were devoted to this work, which stood as the foundation and model for all his later productions.

By the death of Mr. Laurie in 1858, who had previously been the medium of making public Mr. Findlay's works, an opportunity was offered for an enlarged field of enterprise and usefulness, of which he took advantage, resuscitating a business which boasts of being the oldest of its class in Europe but one, and that the respected house of Van Keulen, of Amsterdam, which has existed nearly two and a half centuries. Since that date he has been patiently and

thoroughly working out the designs which he had formed, and which he lived to accomplish, the greatest of them being his series of 'Six Nautical Directories for the whole World,' comprising 6000 pages. These constitute a monument of industry and perseverance, and are accepted as standard authorities in every quarter of the globe. His books, including the above with the minor but equally valuable 'Sailing Directions,' amount altogether to the enormous total of nearly 10,000 pages, and all are now in constant and daily use.

As a Cartographer Mr. Findlay showed a practical knowledge of the sailor's requirements which the Hydrographic Department of the Admiralty were not able to surpass, and his series of Charts are well known and appreciated by the Mercantile Marine.

Notwithstanding that his own occupations demanded all his energy, he contrived to study numerous branches of science, the results of which, from time to time, were communicated to this and other Societies for the public benefit, and for one of these, on 'The English Lighthouse System,' the Society of Arts awarded him a Medal.

Mr. Findlay was endowed with a wonderfully retentive memory, which stored up information from all sources, and readily yielded itself for use, when called upon, to the most minute detail. The multitude of subjects with which he was conversant was always a matter of surprise to his numerous scientific and other friends. The subject of Ocean Currents was one to which he gave great thought and attention, and he endeavoured, by the digestion of all available information, to reduce to order and usefulness the system of Nature's laws for the advantage of the seaman. On several occasions this Society has received valuable additions to its 'Journal' from his fertile brain and ready pen, one of which, on the Gulf-stream controversy, will be fresh in the minds of many.

In Arctic discoveries he always took a deep interest. At the time of Sir John Franklin's catastrophe he sifted the uncertainty of his route in an able paper contained in the 26th volume of the 'Journal,' and he served as a member of the Arctic Committee of our Society which prepared the arguments that have at length led to our Government undertaking the Expedition now on foot.

Although Mr. Findlay's works are principally Hydrographical, yet he was ever competent to take part in Geographical discussions, and devoted much time to his friend Dr. Livingstone's labours, for whose determined character he had much admiration; indeed the question of the Sources of the Nile was the last subject of

his careful investigations, as it was that of his lamented friend. The 29th volume of the Society's 'Journal,' which is occupied entirely by Captain Burton's detailed account of his researches, in company with Captain Speke, in the Lake Regions of Central Equatorial Africa during the years 1857–9, is illustrated by a Map of their routes, constructed by Mr. Findlay from the observations of Captain Speke. This Map has since been extensively used as a foundation for numerous delineations of the successive explorations of Livingstone, Grant, and Baker. The question of the connection of the Lake Tanganyika with the Nile formed the subject of a paper contained in the 27th volume of the 'Journal,' accompanied by a comparative series of Maps relating to the northern end of the lake.

He was elected an Honorary Member of the Società Geografica Italiana in 1870, under the Presidency of that able Geographer, the Chevalier Cristoforo Negri.

Mr. Findlay's private life is known to few, but those who are acquainted with it held in the greatest respect his noble and unselfish spirit. Leaving no children to continue his good name, he has entrusted this duty to his nephews, who, uniting their efforts, will doubtless endeavour to maintain the reputation of his works, and in so doing perpetuate his memory.

M. D'AVEZAC.—During the past year we have lost our oldest and one of the most distinguished of our Honorary Corresponding Members, M. d'Avezac. The death of this eminent French geographer has been deeply felt by his own countrymen; but his labours during more than half a century have been too valuable to geographers of all nations not to have called forth a feeling of general regret at his loss.

Marie-Amand-Pascal d'Avezac de Castera Macaya was born at Tarbes on the 18th April, 1800, of an old family of excellent position in Bigorre, on which country he published, in 1823, a work in two volumes, entitled 'Essais historiques sur le Bigorre.'

In 1833 he read before the Academy of Sciences in Paris a memoir, entitled 'Examen et rectification des positions déterminées astronomiquement en Afrique par Mungo Park;' and from this period till his death we find him producing a multiplicity of valuable geographical works, from the number of which I can only afford space to quote such as most prominently indicate the extent and variety of his attainments, and of his application of them.

In his 'Esquisse générale de l'Afrique, et l'Afrique ancienne,' published in 1844, and in his 'Iles d'Afrique,' published in 1848, we find combined in him the historian, the descriptive geographer, the man of science, and the antiquary. Of the interest he took in technical geography, we have evidence in his 'Aperçu historique sur la Boussole et ses Applications à l'Étude des Phénomènes du Magnétisme Terrestre,' published in 1860, and in his 'Coup d'œil historique sur la Projection des Cartes de Géographie,' published in 1863. The predilections of M. d'Avezac, however, mainly leaned to the antiquarian side of geography. In 1852 he published a valuable memoir on the ancient Istriot geographer, 'Ethicus.' In 1845 he had brought out a little work on 'Les Iles fantastiques de l'Océan occidental du moyen âge;' and it was about this time (1845–6) that his researches into the history of Atlantic discovery led him to dispute the claims to priority on behalf of the Portuguese, which had been put forth in 1842 by the Viscomte de Santarem. While it is impossible to doubt that each of these learned men was actuated by the most honourable motives, it is, perhaps, equally to be feared that the love of country carried each somewhat beyond the limits of impartial criticism. But not the less have the learned researches of the two supplied us with a variety of facts of much value in the history of geography. In later days M. d'Avezac has occupied himself with 'Considérations géographiques sur le Brésil, à propos de l'histoire de cet empire par M. de Varnhagen,' and with dissertations on the date of the birth of Columbus, and the authenticity of the narrative of the life of the great discoverer by his son Ferdinand.

M. d'Avezac was admitted into the Société de Géographie in Paris in 1831, and from 1833 to 1835 occupied the post of "Secrétaire Général" to the Society. Thirteen times he was elected Vice-President, and six different times he had the honour of occupying the chair of President of the Society. In 1873 he received, as an entirely exceptional honour, the title of honorary President of the Central Commission of the Society. M. d'Avezac was a member of the Institute of France, and one of the founders of the Ethnological Society of Paris. He was elected an Honorary Corresponding Member of our Society in 1836, and took pleasure, when his health permitted, in visiting the meetings of the Geographical Section of the British Association. He was also an honorary member of the Asiatic Society, and of many other literary societies in Europe, Asia, and America, and was decorated with many foreign orders.

These are some of the facts by which M. d'Avezac was known to the world at large. Those who had the honour and privilege of knowing him personally, can never forget that unvarying kindliness of manner which was the natural expression of his frank and generous character. His zeal in controversy never betrayed him into the slightest deviation from courtesy, and he begrudged no amount of labour that might give proof of the loyalty of his friendship. He was sincerely beloved and honoured by the *élite* of the French literary world, and when, after six months of exhausting suffering, passed unremittingly in the prison of his arm-chair, his worn-out body was carried to the grave, that love and that respect were testified by the presence of all the members of the Institute of France, and by such of the members of the Société de Géographie as were at the time present in Paris. An allocution was then pronounced in his honour by M. Alfred Maury on the part of the Institute, and another by M. Deloche on the part of the Société de Géographie. M. d'Avezac's death took place on the 14th of January last.

Henry Grinnell.—The name of Henry Grinnell, of New York, will ever be held in the highest esteem by English geographers for the prominent part he took in promoting the search of the lost Sir John Franklin, and for having equipped at his own cost the vessel which sailed with that object under the command of De Haven in 1850. He was born at New Bedford, in Massachusetts, but he removed at an early age to New York, where, in course of time, he became a shipowner and merchant, and arrived at great wealth and reputation. He was the founder and first President of the American Geographical Society, and was elected in 1862 one of the Honorary Corresponding Members of our own body. Part of the expense of the celebrated expedition of Dr. Kane, and the later voyages of Hayes and Hall, was defrayed by this enlightened and munificent patron of geographical enterprise. He died at New York on the 30th of June, 1874, at the age of seventy-five.

Sir Charles Lyell, Bart.—Although known to the world almost exclusively as a geologist, this distinguished writer and worker may be claimed also as a geographer, on account not only of the numerous journeys he undertook to distant countries for scientific investigation, but because Geology, in his hands, especially in his greatest work, 'The Principles,' embraced, to a great extent, the

same class of phenomena as Physical Geography. It is claimed for him, with justice, that he was the first to seek, with complete insight and definiteness of aim, in physical agencies now in operation, the causes of those great changes which the earth and its inhabitants have undergone in past times; and such inquiries necessarily included an explanation of the latest changes which brought about the present configuration of the earth's surface. In fact, to the Physical Geographer, 'The Principles of Geology,' particularly the 10th and 11th editions, and his 'Antiquity of Man,' are rich storehouses of facts and reasonings in this department of science, which he would search for in vain elsewhere. This great philosophical geologist, from the first, took an interest in the aims of our Society, having joined it in the year of its foundation, and paid frequent visits to its collections for the purposes of inquiry and reference up to within a few months of his death.

He was born at Kinnordy, in Forfarshire, the residence of his father, a landed proprietor of the county, on the 14th of November, 1797. His early education was received at a private school at Midhurst, and in due time he entered at Exeter College, Oxford, where in 1819 he took his Bachelor's degree and obtained a second class in Classical Honours in the Easter Term. He was first led to the study of Geology by attending Dr. Buckland's lectures on that science after leaving the University, and henceforward he devoted all his time and energies to the fascinating pursuit. The first portion of his 'Principles of Geology' appeared in 1830; but before that date he had contributed numerous papers to the Geological Society, which gave indications of those powers of accurate observation and philosophical generalisation which subsequently procured for him the reputation of the greatest geologist of the day.

It is not our purpose, nor is this the place, to pass in review the numerous subsequent works he published on geological subjects. A few details may, however, be given regarding the many journeys he undertook for the purpose of geological investigation of distant localities. In the earlier part of his career he visited, with this object, Norway, Sweden, the Danish Islands, Switzerland, Southern Italy, and Spain; and the successive editions of 'The Principles' were enriched by the observations made during these tours. In 1841 he undertook a longer journey to the United States of America, remaining for a year, and travelling over the Northern and Middle States as far southward as Carolina. The general results of this important journey were given to the world in his narrative, in two

volumes, entitled, 'Travels in North America, with Geological Observations on the United States, Canada, and Nova Scotia,' published in 1845. Besides its special interest in relation to Geology, this work proved attractive as containing the observations of a thoughtful mind on the social, œconomic, and general aspects of the country, and justifies us in placing our deceased colleague in the foremost rank of travellers. In 1845 he paid another visit to North America, devoting himself more especially to the Southern States and the shores of the Gulf of Mexico. An account of this journey was given in his 'Second Visit to the United States of North America,' published in 1849.

Sir Charles Lyell received the honour of Knighthood in 1848, and was raised to a Baronetcy in 1864, on the recommendation of Lord Palmerston, the then Prime Minister. The title becomes extinct by his decease.

The Rev. Charles New.—This distinguished African traveller and Honorary Corresponding Member of our Society, whose recent loss near Mombasa we have to deplore, was born at Fulham in January, 1840. His parents were of humble station in life, but, like those of Dr. Livingstone, endowed with sterling moral qualities, which influenced the character and career of their children. From his father he inherited a spirit of indomitable courage and perseverance, and to his mother he owed the training which gave a pious direction to his mind. The only education he received was obtained at the St. John's National School, supplemented by attendance at the Sunday Schools of the United Methodist Free Church Chapel at Walham Green, during the time when his week-days were occupied in earning the means wherewith to assist his parents. When a little older he learnt the mechanical trade of boot-making, at which he worked until he resolved to choose the profession of minister in the church of his adoption.

About this time he became acquainted with the Rev. John Steele, who took deep interest in him, gave him a home, furnished him with books for study, and encouraged him in the use of his talent as an occasional preacher. His deep piety and consistent character led that gentleman, when on a visit to London, to recommend him to the notice of the Rev. R. Eckett, ex-President of the United Methodist Free Churches. He followed the profession of minister for about three years, and the esteem he gained was shown by his being sent to Bristol as a representative at the Annual Assembly in July, 1862—a

turning-point in his life, as it was there that he was requested to accept the post of missionary in East Africa as the colleague of the Rev. Thomas Wakefield. He left England on the 12th December of the same year; on his way out making the acquaintance of Colonel Playfair, who had been appointed to the Consulate of Zanzibar, and was proceeding thither by the same route.

Reaching Bombay on the 11th January, 1863, he was kindly entertained by Dr. Wilson, of the Scottish Free Church, and by the Rev. D. Williamson, of the United Presbyterian Society, whose generosity made a deep impression on his mind during his two months' stay. Having a recommendation from Sir Charles Wood, then Indian Secretary, the document was presented; and Sir Bartle Frere, with his usual courtesy, granted him a passage on board the *Pleiad* to Zanzibar, where he arrived on the 7th of April, and in another fortnight at Mombasa.

After grappling with fever and acquiring the language, he commenced work among the Wanika in September, 1863. During the nine years he was thus engaged his love of travel led him to make various important journeys in the interior. In 1866 he penetrated among the Gallas, calling at Lamu and Patte, returning by the Ozi, and traversing a portion of the Galla land to Malinde; whence he returned overland by Takaunga to Mombasa. In October of the same year, in company with Mr. Wakefield, he left Mombasa again on another visit to the Gallas, visiting many new districts, the journey occupying about four months.

In July, 1871, he started on his remarkable expedition to Kilima-Njaro, taking Lake Jipe by the way. As already recorded in our 'Proceedings,' he was the first traveller who had succeeded in actually reaching the snows of this wonderful mountain. On Monday, the 14th August, he made his first ascent of Kilima-Njaro, and on the 26th succeeded in his object of reaching the snowy cap. On his return he visited the previously unknown Lake Chala, and arrived at Ribé, the Mission Village near Mombasa, on the 10th of October. Not the least important of his services to science on this hazardous but successful journey was the making a collection of the plants growing near the snow-line on Kilima-Njaro, which was found to possess peculiar interest.

After this last undertaking Mr. New obtained leave of absence for the purpose of visiting his native country, and on the 15th March, 1872, arrived at Zanzibar. Here his journey to England was interrupted by his being invited by our Council to join the

Livingstone Search Expedition, under Lieutenant Dawson; but Mr. Stanley arriving in the mean time from his successful succour of the great traveller, the Expedition was broken up, and he came home. While in England during this temporary visit, he was actively employed in the work of the Missionary Society to which he belonged, attending the meetings, besides lecturing in most of the principal towns of the kingdom for the British and Foreign Anti-Slavery Society. He found time, however, to write an account of his ten years' labours and travels, which he published under the title of 'Life, Wanderings, and Labours in Eastern Africa.' Previous to his departure for Africa the second time, he was received, on the recommendation of Sir Bartle Frere, as a Corresponding Member of the Royal Geographical Society, an honour which seemed to inspire him with a stronger desire to do the work on which his heart was set.

He left England again on the 7th of May, 1874, arriving in Zanzibar after a quick passage of twenty-six days. In less than a fortnight he had organised a party for a trip to Usambara; and in less than two months after his departure from England he was again in the heart of the African jungle, visiting Vuga, the capital of Usambara, and travelling thence across the picturesque and little known country which lies betwen Vuga and Mombasa. An account of this journey was transmitted by him to us, and read at our Meeting of the 12th April last. After a short period of rest at the Mission Village of Ribé, on November 30th, 1874, he wrote to his family: "I am ready to start for Chagga, my men cross for the mainland to-day; I shall be away for three months or longer, but you shall hear from me as soon as possible." The promised communication was never made, for he died on his return journey. It appears from a statement made by the Rev. Mr. Williams, of the Church Missionary Society, that he made his way to Chagga, but found the Chief very exacting, so that, after staying some time, he started back for the coast. On Saturday, February 13th, 1875, he sent a letter to his colleague, stating he was very ill, and begging some assistance. This was promptly attended to, but the succour arrived too late; he had expired when the messengers returned. Mr. Wakefield was soon by his corpse, which was carried to Ribé, and buried by the side of former colleagues, equally victims of this treacherous climate.

Augustus Raymond Margary, who was barbarously and treache-

rously murdered at Manwyne on the south-west frontier of China, on the 21st or 22nd of February last, was the third son of Major-General Margary, R.E., and was born at Belgaum; Bombay, on the 26th May, 1846.

As a child he was remarkable for his sweetness of disposition, courage, and intelligence. His natural perseverance and aptitude were such that, although he had no instructor but his mother in the tropical climate in which his first years were spent, when sent home to school in France, at the age of nine years, he took his place with ease amongst English boys of his own age. After a time spent under the care of the Rector of Swafield in Norfolk, and at the North Walsham Grammar School, he was for seven or eight years at Brighton College; and having further pursued his studies for two years at the London University, he obtained a nomination to compete for a student interpretership in China. He succeeded in passing a successful examination, and was sent out in that capacity on the 20th March, 1867. His strict attention to duty and study at Pekin again secured his success, and he obtained the reward for rapid proficiency in the Chinese language.

In 1870 he was sent as interpreter to Tam-suy in Formosa, and made during his residence several excursions into the northern part of the island. When at Ke-lung he had, with his friend Mr. John Dodd, a British merchant there, the happiness of rescuing about forty-two lives from shipwreck at the risk of his own, during the raging of a violent typhoon on the 9th August, 1871, for which deed of bravery they both received the Royal Humane Society's medal, and were honoured by the Queen with the decoration of the Albert Medal of the First Class. In 1872 he visited his native land for sixteen months, and took part in a discussion on Formosa at one of our evening meetings during that time. Returning to Shanghai, *viâ* the trans-continental railway through North America, and touching at Japan, he received instructions in August 1874 from H.B.M.'s minister at Pekin, to proceed at once through the vast south-western provinces of China to await at one of the passes on the frontier of Yun-nan the arrival of Colonel Browne's exploring party from Calcutta, which was to proceed *viâ* Burmah and up the Irrawaddy.

In a letter dated August 16th, 1874, he wrote: "My mission is a very arduous one for me to undertake single handed;" but he called it a splendid mission, and said, "I have only to pray for

health and strength to carry me through, and there is no doubt I shall have had the privilege of doing some service to the world at large." Afterwards, in a series of long and most interesting letters, he gave an account of the whole journey, with a touching description of the manner in which he had to steal away from Shanghai under cover of the darkness, without bidding any of his friends adieu, secrecy having been strictly enjoined by the authorities lest any obstacle might be placed in his way by the Chinese local mandarins. He voyaged up the Yangtsze in the steam-ship *Hirado*, "stepping across a pontoon on to one of those American river-palaces, which plough up and down the huge rivers." He describes his great interest in gazing on the wonderful old city of Nankin—the theatre of so many atrocities during the Taeping rebellion; its grim, dirty walls, built into the sides of hills which skirted one face of the city. For some miles nothing could be seen but these grim battlements. At Chung-Ching he expected his difficulties would commence, having thence to enter a portion of China, where a foreigner had never been seen. Leaving the great steamer at Han-kow, he took a "house-boat," and his route followed the bend of the great Yangtsze-kiang to the entrance of the Tung-Ting Lake, which he crossed. The boat then entered a river (the Yuen), which flows in at the south-western extremity of the lake, and after passing Chang-teh, continued up the stream to the borders of the province of Kwei-chow. There his navigation came to an end, and the land journey commenced in chairs over the magnificent passes that abound in that mountainous province, the beauty and grandeur of which he could not find words to describe. He was seized with very serious illness while in the "house-boat." Fever, pleurisy, and at last dysentery attacked him, reducing him to a skeleton; but he recovered, and gained strength when the effects of a voracious appetite began to tell. At Chin-yuen, where the boat journey ended, he with difficulty escaped the violence of the mob. He slept in the town, but was off by daylight, and they actually destroyed the boat which he had hired at Han-kow.

At Kwei-Chow he visited the Governor, and called privately on the French Bishop, who conversed in Chinese, and seemed to have forgotten his own tongue! He found him living in a yamen, and insisting on styling himself a "Ta-Jën" (great man). During this part of his journey Mr. Margary was greatly annoyed by the curious prying eyes of the natives.

At the city of Yun-nan and beyond, at each place where he

stopped his wants were attended to, and food comfortably provided. Two military officers were sent to accompany him to Ta-li Fu. According to his letters home, these officials showed him all sorts of kindness and honour. From Yun-nan he went to Chow-Chow, 10 miles from Ta-li, which place he made his headquarters, returning there to his servants and baggage, after having paid his visit to the wonderful old city, in spite of most earnest entreaties and warnings against the danger of doing so. His successful interview with the Tartar General, the Taotai, the Prefect, and the Magistrate, gratified him much. "All these meetings," he wrote, "effect an infinity of good, in establishing an amicable footing between us and the Chinese; and I am proud to think that I have drawn a successful trail across a large extent of country. I am not boasting, and really don't care twopence about myself in the matter; but the good sound impressions I have laboured to produce make me zealous for my country's advantage, and fill me with elation."

On the 5th January he reached Tèng-yueh-Chow, or Momein. "This," he wrote, "is the very end of China, and the goal I sought. But I am going further." He received a despatch from the Political Agent at Bhamo, saying that the Expedition had not yet started, and he was to join it at Bhamo soon after January 1st. A journey of seven stages had to be performed before reaching the well-armed English party. A Burmese guard of forty men was sent to conduct him through the wild Kakhyen hills, and he reached Bhamo on the 15th January, where he had the great pleasure of meeting again with fellow-countrymen, after his wonderful journey of 2000 miles across a region which no Englishman had previously succeeded in traversing.

He had but few days to rest, for on the 23rd Colonel Browne decided to start the Expedition. The intention of the leader had been to go by the lower mountain-passes from Sawuddy; but meeting with various hindrances and preposterous demands on the part of the natives, this route had to be abandoned, and unhappily for the brave subject of this sketch, the upper, dangerous, and difficult track was determined on. A fresh start was made *viâ* Tsikaw and Serai, to the town of Manwyne, where Mr. Margary went forward to reconnoitre, and fell in the execution of his duty.

In the death of this enthusiastic young traveller the Society has lost a Member whose future career was full of promise, and his family mourn one of whom an affectionate parent writes: "None

can replace him in the circle where only he was truly known; so true, so faithful, so unselfish was he."

VICE-ADMIRAL SIR HENRY KELLETT, K.C.B.—After passing the first three years of probation in the Navy in the West Indies, young Kellett joined the *Eden*, under the command of that able and scientific officer, Captain W. F. Owen, and by him was initiated into, and learned to like, that surveying service which he stuck to throughout the greater part of his career with so much benefit, not only to his own country, but to the world at large. Few officers of H.M.'s Navy have gone through such a career of public utility. Out of 41 years of active service, two-thirds were spent in advancing our knowledge of the globe. The coast of Africa, the Mediterranean, the coast of Portugal, all bear testimony to the result of his early labours; but it is in the Pacific Ocean, and upon the coast of China, that he has especially left a record which will establish his name as one of the ablest and best contributors to the correct delineation of the shores of those countries. On the coast of China, after taking so important a part in the first war there that he received in the course of two years his promotion from lieutenant to captain and the honour of the Companionship of the Bath, he remained in the country until a sufficient survey of that hitherto unknown coast was produced, to enable the merchants to avail themselves of the Treaty Ports which had been opened. On the west coast of America no one else ever had so complete a knowledge as he had of it from lat. 72° N. to 33° S. In the voyages of the *Sulphur* and the *Herald* the delineation of the coast was laid down with great accuracy from the River Guayaquil to Vancouver Island; and he may be said to have taken a personal part in the survey of every harbour of importance from lat. 8° S. to 60° N. Called upon to take part in the search for Sir John Franklin, he saw Lieutenant Pullen safely on his way round Point Barrow in his boat expedition to the Mackenzie, and subsequently discovered that land to the north of Siberia which had hitherto only been known by report from the natives. The following year, having previously, by his survey of the Amoukta Channel, provided Captain M'Clure with the means of safely passing through the Aleutian chain of islands, and thus making the rapid passage which enabled him to round Point Barrow that season, he accompanied him up to the edge of the ice, little imagining where they would next meet. That meeting, as is well known, took

place two years and nine months afterwards on board the *Resolute*, at Dealy Island.

Returning to England in the *Herald* in 1851, he was appointed to the command of the *Resolute* in 1852; and, in the two years following, the north face of the Parry group was completely explored by expeditions from that ship and the *Intrepid;* the crew of the *Investigator* were rescued from their perilous position in Mercy Bay, and tidings of the safety of the *Enterprise* obtained. Being caught in the pack in attempting to return to the eastward in 1852, he was ordered to abandon the ship in the spring of 1853, and returned to England in the *Phœnix.* A court-martial was held upon the officers and crew at Chatham for the loss of the ship, when the president observed that he experienced much pleasure in returning Captain Kellett his sword, which he had worn with so much satisfaction and advantage to his country. In 1854 he was appointed Commodore in the West Indies; a position which he worthily occupied for the long period of five years, indicating the confidence of Government in the many important questions he had to settle; and, upon his vacating the command, receiving from the merchants of Jamaica a handsome service of plate, in recognition of their estimation of his character. From 1864 to 1867, as Admiral-Superintendent of Malta Dockyard, he had an opportunity for the exercise of that geniality and energy which distinguished him, in the troublesome business of the extension of the dockyard which was then in progress.

The final service of his long, active career was as Commander-in-Chief on that Chinese station on which 30 years before he had left an enduring mark. Returning in 1872 to England, much enfeebled by long and arduous service in every climate, he retired to his country seat at Clanocody, near Clonmel, with the hope that rest and quiet might restore him to health. In this hope, however, his friends and relatives were disappointed, and on the evening of March 1st he passed quietly away to his rest.

In Henry Kellett we have an admirable example of the scientific officer of our Naval service: a man who combined skill, indomitable energy and seamanship, with frank boldness. It is by such men, working for years laboriously and unostentatiously, and, it is to be feared, but little appreciated beyond the walls of this Society, that the great additions have been made to our nautical knowledge of the world, by which geographical science has been advanced, and ocean navigation made more secure. And it is by the proper use of such men on our Naval and Military expeditions

that advantages are reaped, in some respects more lasting and beneficial than many of those obtained by the direct force of arms.

CHARLES F. TYRWHITT DRAKE.—This accomplished Eastern traveller was the youngest son of Lieut.-Colonel William Tyrwhitt Drake, R.H.G., and was born at Amersham, on the 2nd January, 1846. He began his education at Rugby, and was, after a short time, removed to Wellington College, where, to use Dr. Benson's (the head master's) words, "He was our chief naturalist; he found out the great variety of birds which inhabited the fir woods and the heaths, the Finchampstead Ridges, and the rich Blackwater Valley. He knew, I believe, the flight and note of every species. He was also a good botanist." When he left Wellington College he proceeded to Trinity College, Cambridge, but, owing to ill-health (chronic asthma), he was obliged to go abroad for the winters, and so never took a degree. He spent the winters of 1866 and 1867 in Morocco, making expeditions from Tangier to Mogador, and even as far as the city of Morocco. During these excursions he acquired that knowledge of Eastern language and character which was afterwards turned to such good account in his subsequent explorations of Palestine and Syria. The winter of 1868 he spent in Egypt, improving his knowledge of Arabic; and in the spring of the following year he made an expedition to Sinai, where he made the acquaintance of the officers of the Sinai Survey Expedition, who had just completed their labours, and were on the point of leaving. In the autumn of the same year he returned to the East in company with Mr. (now Professor) E. H. Palmer, and, starting for Suez on foot, the two travellers thoroughly explored, for the first time, the Bádiet el Tîh, or the Wilderness of the Wanderings; the Heyeb, or *south country* of Scripture; the mountains of the Azazemeh, and parts of Edom and Moab. It may here be mentioned that the map made by the two travellers, though they were previously totally unused to surveying, was only 1½ mile in error in the whole distance from Nakel to Hebron, a total distance of over 600 miles; and less than a mile wrong in Moab. The accounts of these journeys, and the maps made by Drake and Palmer, will be found in the 'Desert of the Exodus,' and the 'Palestine Exploration Fund's Quarterly Journal.'

In 1870 Mr. Drake again started for the East, his object being to obtain copies of the celebrated inscribed stones at Hamath, which have since been removed to the museum at Constantinople.

On his return from this expedition he joined Captain Burton, then Consul at Damascus, on a most adventurous expedition to the volcanic regions east of Damascus, and to the "Aláh," or highlands of Syria. The results of these journeys have been published by him and Captain Burton jointly in two volumes, entitled 'Unexplored Syria,' in which the maps and sketches were entirely his work. A paper relating to a portion of the same journeys was published in vol. xlii. of the 'Journal' of our Society, as the joint production of Captain Burton and Mr. C. Tyrwhitt Drake.

From that time to his death he was employed by the Palestine Exploration Fund on the Survey of Palestine, and his papers in their Quarterly Journals bear record to the earnestness and linguistic skill and knowledge which he brought to the task.

While encamped at Ain Sultan, in the Jordan Valley, he had a bad attack of fever, at Christmas, 1873; and this had so weakened him that, when again struck down in May, he was unable to rally, and expired on 23rd June, 1874. He was buried the same day in the English Cemetery at Jerusalem.

At the time of his death, he had gone to Jerusalem to make his final preparations for a holiday excursion into the mountains of Syria; and he had long looked forward to another expedition to Morocco for the purpose of exploring the Atlas chain when his work in Palestine should be finished.

Mr. Drake was elected one of our Fellows in January, 1872.

Dr. C. T. Beke, the well-known traveller and geographical critic, died on the 31st of July last, in the 74th year of his age. He was descended, as we are informed, from a good old Kentish family, which had given its name to, or taken it from, Bekesbourne, near Canterbury, at which place our deceased Associate resided during many of the later years of his life. Originally engaged in commercial pursuits in England, and for a time also in Italy, he subsequently studied law, and in 1837–8 he was Acting-Consul for England in Saxony. Shortly previous to this he made his appearance as an author by the publication of his 'Origines Biblicæ, or Researches in Primeval History,' a treatise which brought him into prominent notice, through the controversies which his views on some points of his subject gave rise to. In 1835 he published a paper 'On the Geological Evidence of the Advance of the Land at the Head of the Persian Gulf,' which was followed in 1836 by another, 'On the former Extent of the Persian Gulf, and on the

Non-identity of Babylon and Babel.' The bent of his mind at this time, and it may be said throughout his life, was towards Historical Geography and Ethnology, particularly in reference to the countries of North-Eastern Africa and South-Western Asia, which have always excited so large an amount of popular interest; and whenever the public mind was excited by some discovery or remarkable event in these regions, the pen of our talented Associate was called into activity. In 1836 appeared his treatise 'On the Complexion of the Ancient Egyptians,' and in 1838 his 'Passage of the Red Sea by the Israelites, and its locality; and on the situation of Mount Sinai.' This last-mentioned was a subject which he re-agitated towards the close of his life, when he undertook in the winter of 1873–4, being then seventy-three years old, a journey to the head of the Gulf of Akaba, in order to establish the proof of his conjecture that the true Mount Sinai was situated to the east of the gulf, instead of to the west in the peninsula to which it has given its name.

In 1840 he undertook a journey to Abyssinia for the purpose of opening up commercial relations between that country and the adjoining dependencies of Egypt. During this expedition he rendered considerable service to geographical science by the numerous observations for the latitude and altitude of the places he visited, and especially by his exploration of the southern borders and tributaries of Lake Tsana. He entered Abyssinia from the south, having landed at Tajurrah on the 15th of November in the above-mentioned year, and proceeded by way of Shoa to Gojam, where he remained until February 1843, when he returned by Lasta and Tigré to Massowa. A narrative of his proceedings was contributed to our Society, and published in the 12th, 13th, and 14th volumes of our 'Journal.' For this important service he received the Founder's Gold Medal for the promotion of Geographical Science and Discovery in 1845. The information obtained on a variety of special subjects during this journey was given to the public in a series of memoirs, published from time to time in subsequent years. Such were his 'Origin of the Gallas,' 1848; 'On the Geographical Distribution of the Languages of Abyssinia and the neighbouring Countries,' 1849; 'On the Korarima or Cardamom of Abyssinia,' 1847; 'Remarks on the Mats'hafa Tomar, or the Book of the Letter, an Ethiopic MS. in the University of Tübingen,' 1848; and many others. He afterwards edited the work of Gerrit de Vere on Dutch Voyages to Spitzbergen and Nova Zembla in 1594–6, which was republished by the Hakluyt Society in 1853.

Dr. Beke's attention was next turned towards the subject of the sources of the Nile, and to him, I believe, belongs the honour of having first suggested the east coast of Africa at Zanzibar as a suitable starting-point for an expedition to solve the great geographical problem. When he attempted in 1848 to give practical effect to his views, he was not successful; but he had the satisfaction, ten years later, of seeing them carried out by Captains Burton and Speke, and of pointing to the great discoveries achieved by this and other subsequent expeditions as proving the truth of his surmises. Henceforward he came frequently before the public as a writer and lecturer on the subject of the Nile, and his lucubrations were always remarkable for the boldness of the hypotheses he hazarded on points of geographical fact, as well as for the extensive knowledge he displayed of the literature of the subject.

During the period immediately preceding the Abyssinian war, Dr. Beke took a prominent part in the discussion which arose with regard to the best mode of obtaining the release of the English captives, and even made a journey himself to Massowa on behalf of the friends of the missionaries who were incarcerated with the British Consul and officers, for the purpose of trying his influence on King Theodore. He was not permitted, however, to make the journey to Magdala, and returned to England without having effected their release. The services he rendered to Her Majesty's Government by supplying information regarding Abyssinia, on which he was so competent an authority, were substantially rewarded on the completion of the campaign.

The last undertaking in which Dr. Beke was engaged was that to which I have already alluded, namely, the attempt to verify, by personal examination, his conjecture regarding the true Mount Sinai. He left England in December 1873, accompanied by Mr. John Milne, as Geologist and Surveyor, and was conveyed, by the liberality of the Khedive of Egypt, in one of the Government steamers to Akaba, whence he proceeded to the Harra Radjlâ, in Arabia Petræa; and after taking observations for the altitude of the mountain, and examining the surrounding country, returned to Europe, claiming that all the necessary conditions of the Mount Sinai of Scripture were fulfilled by Jebel en-Nar. He was detained for some weeks on his way home by a severe attack of illness, and died, not long after his return, as already stated, on the 31st of July last.

WILLIAM WINWOOD READE, the well-known African traveller and writer, was the eldest son of William Barrington Reade, of Ipsden, Oxfordshire, and of Elizabeth, the Lady of Ardbenny, N.B., the only child of Captain J. Murray, R.N., many years employed in command of H.M.S. *Sorlings*, surveying in Australia. He was born at Murrayfield, near Crieff, N.B., on the 26th December, 1838. Primarily he was under the tutorage of the Rev. Dr. Godby, Head-master of the Royal Grammar School at Henley-upon-Thames; afterwards under that of Dr. Behr, at Winchester, from whom he was transferred to Magdalen Hall, in the University of Oxford.

He very early in life displayed a taste for literature and scientific studies. Fired by perusing M. Du Chaillu's adventures in the Gaboon region of Western Africa, he started off to the same country, ambitious to secure live gorillas. He hunted those animals with great patience, but finding them, so far from being pugnacious, too difficult of access, he expanded his trip into one of research and exploration. On his return, he published his 'Savage Africa.' After some time devoted to science, literature, and the study of medicine, he revisited Africa under the auspices of Mr. A. Swanzy, principally with a view to observe the vegetable productions of various interior districts near the Gold Coast, to visit various tribes, and to endeavour to extend facilities for trade. Here, all alone, he showed his natural courage and perseverance; he penetrated to unvisited regions, and completed his tour by leading an expedition from Sierra Leone to the upper waters of the Niger. The latter important journey was undertaken at the request of the Colonial Government of Sierra Leone. He started in January 1869, and succeeded in reaching Farabana, a town of 10,000 inhabitants, on the upper waters of the Niger. The results of the journey went to show that the Niger flowed within a distance of 250 miles from Sierra Leone, and was navigable from a point only 350 miles distant from the colony. An account of the Expedition was communicated to our Society by the Secretary for the Colonies, and published in our 'Proceedings,' vol. xiv. p. 185. He has given a full account of this his second period of West African travel, lasting two years, in his work entitled 'The African Sketch Book.' In the Ashantee campaign Mr. W. Winwood Reade acted as special correspondent of 'The Times.' Here, as usual, he did not spare himself. Always with the front, personally engaged in the ranks of the 42nd in the great battle of Amoaful, where he was hit three times, though not wounded, he pushed on with that

gallant regiment, and was the only civilian who with it marched into and captured Comassie. But this last visit to Africa ruined his health. He returned ill; disease, both in the lungs and heart, declared itself. He gradually wasted away, writing his last book, 'The Outcast,' as it were, in the throes of death; and having been removed, under a forlorn hope, to the house of his friend Dr. Sandwith (of Kars), he died there on the 24th April, and was buried at Ipsden on the 29th, in the 37th year of his age.

As a youth, he published a novelette, 'Charlotte and Myra;' afterwards, an archæological volume, 'The Veil of Isis,' indicating great research; and a novel called 'See-saw.' His subsequent works appeared in the following order:—'Savage Africa,' 'The Martyrdom of Man,' 'The African Sketch Book,' 'Comassie,' and lastly, 'The Outcast.'

Dr. John Edward Gray, F.R.S.—This well-known naturalist, who occupied for many years the important post of Keeper of the Zoological Collections of the British Museum, took a deep interest in Geography, as he did in most other branches of science related to his own special pursuit. He was one of the original members of our Society; and although I am not aware of his ever having contributed to our Transactions, he was occasionally a speaker at our meetings, especially at the time—now nearly 30 years ago—when there was much discussion with regard to the general management of our affairs. In more recent times, he showed his zeal in geographical questions chiefly by his criticisms of the narratives of travellers, in which his love of controversy and impatience of all departure from scrupulous accuracy of statement were very conspicuous. It is not the place here to enter into the question of his merits as a zoologist, or do more than allude to the vast amount of published work he has left as a record of his laborious life. It may be mentioned, however, in justice to his sagacity as a naturalist, that throughout the long period during which the national collections of zoology were under his charge he never lost sight, as was previously, and is still elsewhere too frequently done, of the great scientific importance of affixing locality tickets to every one of the thousands of specimens which were annually added by travellers to the Museum stores; thus laying a solid foundation for the future elaboration of the law of Geographical distribution. He contributed the zoological appendices to the narratives of some of the chief expeditions of discovery; such as the Voyages of the

Erebus and *Terror*, the *Sulphur* and the *Samarang*. After 50 years of service, altogether, in the British Museum, he retired in December last, to enjoy the repose to which he was so well entitled, but which he did not long enjoy. He died on the 7th of March, at the age of 75 years.'

Frank Oates, a young Naturalist traveller of great promise, died on the 5th of February last, in the interior of Southern Africa, whilst on his way back from the Victoria Falls of the Zambesi. He was the eldest surviving son of the late Mr. Edward Oates, of Meanwood Side, near Leeds, and was born on the 6th of April, 1840. After the completion of his education at Christ Church, Oxford, he sought to gratify his strong taste for foreign travel and the practical study of natural history, by a voyage to North and Central America; and on his return from this, his first expedition, in 1872, became a Fellow of our Society. Soon afterwards he planned, with his brother, a journey from Natal into the interior of South Africa, and, in addition to his zoological outfit, provided himself with the necessary instruments for fixing and plotting his route, should he be able to carry out his earnest desire to explore new districts. His journey to the banks of the Zambesi was successfully carried out, and he succeeded in amassing large collections of objects of natural history; but unhappily he delayed his stay until the unhealthy season came on, and contracted a fever, which proved fatal when some days advanced on his homeward march. He died in the Matabele country, at a place about 80 miles north of the Tati river. His family have taken steps to recover his collections and journals which remained in the hands of the Rev. John Mackenzie, of Shoshong, Bamangwato; and as he was known to be an accurate and intelligent observer, it is to be hoped his notes may hereafter be published for the benefit of science.

Sir John Rennie.—By the lamented death of the eminent civil engineer, Sir John Rennie, we have lost the oldest English representative of that science which during the last century has reflected such distinction on our country, not only in the magnitude of the works constructed, but in the originality of invention which has been brought to bear on them. Sir John, who was born on August 30th, 1794, had, conjointly with his father, the late Mr. John Rennie, built both Southwark and Waterloo bridges, and after his father's death in 1821, completed several important works on which

they had been unitedly engaged, viz., London Bridge, Plymouth Breakwater, Sheerness Dockyard, and the completion of Ramsgate Harbour. On the opening of New London Bridge, in 1831, he received the honour of Knighthood. For ten years previously he had held the post of Engineer to the Admiralty, in which he had succeeded his father. It was he who, conjointly with his late brother, Mr. George Rennie, mainly contributed to introduce the screw propeller into the navy, and he was the first to utilise the diving-bell in engineering works. He constructed the machinery for the mints of Calcutta, Bombay, and Mexico, and also erected the Royal Clarence Victualling Yard at Plymouth. In all matters connected with drainage and hydraulic engineering, harbours, canals, and the management of rivers, Sir John was a high authority. He was engaged for a number of years in carrying out the great system of drainage and land-reclamation in the Lincolnshire Fens. Nor were his labours nor his reputation confined to his own country, for he received great distinction from foreign Sovereigns in recognition of his exceptional talent. He constructed the harbour of Ponte Delgada, in the Azores, and received the honour of Knighthood of the Tower and Sword of Portugal. His work on 'The Drainage of Lombardy' attracted so much attention even in Italy, a land so famous for its hydraulic engineering, that the King of Italy conferred on him the order of St. Maurice and St. Lazaro. He was also a Knight of the Wasa of Sweden and Member of the Academy of Science of Stockholm and of the Austrian Society of Civil Engineers. For his beautiful work on Harbours, dedicated to Her Majesty, he received marks of distinction both from the Emperor of Russia and the Emperor of Austria. We have also from his pen a 'Monograph on Plymouth Breakwater,' and a short 'History of Engineering,' in the shape of an address from him, as President to the Institution of Civil Engineers. Sir John was a Fellow of the Royal Society, and of many of the learned and scientific Societies of London. He was also Chairman of the Juries at the Exhibition of 1862. His extensive information, kindly nature, and bright genial expression, both in face and manners, made Sir John a great favourite in society; but of late the infirmity incident to his advanced age necessitated comparative seclusion, and he died, after just completing his 80th year, on the 3rd of September, 1874.

Sir William Fairbairn, Bart., F.R.S., the eminent engineer, who had been Fellow of our Society since 1861, died on the 18th of

August last, at the ripe age of 84. He was born at Kelso, in Roxburghshire, in 1789, and received his early education and his training as a mechanical engineer at Newcastle-on-Tyne. None of the work in which he was engaged throughout his long and active life had any close connection with our own special pursuit, and it need only be mentioned here that he was the author of several important papers on the applications of science, published from time to time in the 'Transactions' of the Royal Society and the British Association; of which latter body he was one of the founders, and President in 1861.

Sir WILLIAM PERRY, who died at Venice on the 24th of August last, had been a Fellow of our Society for the past fifteen years. He was the eldest son of the late James Perry, proprietor of the 'Morning Chronicle' newspaper, and brother of our distinguished Associate, Sir T. Erskine Perry. Sir William was born at Merton, in Surrey, in 1801, and was educated at the Charter House School, whence he proceeded to Caius College, Cambridge, where he took his B.A. degree in 1822. He subsequently entered the Diplomatic Service—first as Consul at Panama in 1841, and afterwards as Consul-General for the Austrian Coasts of the Adriatic, having his headquarters at Venice. After his retirement in April 1872, he was knighted by letters patent in June of the same year, but continued to reside at Venice until his death.

FREDERICK KETELBEY STRONG resided for twelve years, from 1833 to 1845, at Athens, where he held the two appointments of Consul-General for Hanover and Consul for Bavaria at the Hellenic Court. During his residence there he published a work, entitled 'Greece as a Kingdom' (London, 1842), being a statistical description of that country, from the arrival of King Otho, in 1833, down to the year of publication. He resigned his posts in 1845, and then removed to Hamburg, where he died on the 18th of April last. He was in frequent correspondence with the distinguished geographer, Dr. Petermann, who named one of the headlands discovered by the late German Arctic Expedition "Kap Strong," in his honour. He was Commander of the (now defunct) Guelphic Order, and Knight of the Bavarian Order of Merit and of the Saviour Cross of Greece.

Besides the above named, we have to record the loss of the following gentlemen, many of whom had distinguished themselves in

other spheres outside the domain of geography:—James Allan, E. C. Bowra (a Chinese scholar who accompanied the Chinese Customs Commissioners on their visit to England in 1868), R. Benson, W. E. Blair, Admiral F. A. Campbell, C. R. Cope, B. B. Cabbell, J. Dentry, C. W. Eddy, Rev. J. Graves, Commander J. T. Gowlland, the Bishop of Gibraltar, D. Haysman, A. Lang, W. Blake Lambert, R. S. Levinge, the Hon. Sir J. Lindsay, F. H. Leaf, C. C. Macdonald, J. J. Mackenzie, I. T. Pritchard, B. R. Ross, Sir Joshua Rowe, D. Smith, H. B. Simpson, Hon. E. Twisleton, T. P. Tindale, R. Watson, I. Watkins, Rev. A. N. West, J. Young, Colonel P. J. Yorke, W. Henderson, J. Botterill, S. Brown, W. Dell, J. C. Fletcher, F. Hindmarsh, G. E. Wythes, E. Webster, Captain T. P. Wood, T. Forshaw, T. Muir, T. Platt, General J. Drummond, Commander Noel Osborn, and E. Sercombe.

Admiralty Surveys.*—The Admiralty Surveys in progress on our own shores are rendered necessary from year to year either by changes of feature from natural causes, improvements in commercial ports by dredging, and the addition of docks, piers, and other engineering works, or from the more exacting demands of steam navigation and the increased draught of ships. Those in progress in our several colonies are not less essential; and, indeed, more pressing from their rapidly expanding commerce, and from the marine surveys of earlier years failing—not from general accuracy, but from insufficiency of detail—to meet the requirements of modern navigation.

Surveying parties for the past year have accordingly been steadily engaged on those parts of the east coast of Ireland; and the west, south, and east coasts of England, where marked changes of off-lying shoals or banks have been observed. Also in Jamaica, Barbuda, Gulf of St. Lawrence, Newfoundland, and Labrador coast; in Western Australia, South Australia, Victoria, and Queensland.

On foreign naval stations, three surveying ships (men-of-war) have been employed; two on the east coast of Africa, and one on the eastern shores of Japan. In Africa the urgent requirements of our cruisers engaged in the suppression of the extensive slave traffic on either side of Zanzibar, gave full employment to the *Shearwater* and *Nassau*; both ships and boats being actively at work

* By Captain F. J. O. Evans, C.B., F.R.S., Hydrographer.

amongst the countless reefs fringing the shores, and which hitherto have so well sheltered from pursuit the coasting-vessels engaged in the nefarious slave-trade. Commerce eventually will doubtless benefit by this opening up of the ports and anchorages of an imperfectly known coast; at present, however, a valuable surveying force is absorbed mainly in the cause of humanity, and at some risk; for the coast during several months of the year is unhealthy, and the climate in general debilitating.

In the sole interests of commerce the *Sylvia* has been engaged in Japan, receiving from the Japanese Government and local authorities many courteous and kindly actions for facilitating the work. This appreciation by a people who have so recently joined the comity of nations, of the value of the coast survey undertaken by the Admiralty is deserving of special record.

In the Mediterranean, and also in New Guinea, detached surveyors have performed good work: an uncharted part of the coast of New Guinea having been examined in H.M.S. *Basilisk* whilst on her homeward voyage to England, and laid down in sufficient detail for the requirements of a region so remote from civilisation and commercial routes.

The voyage of the *Challenger*, in addition to the deep-sea explorations, still furnishes valuable hydrographic knowledge, by revising errors, adjusting inadequately-reported details, and clearing away fabulous dangers in the several tracks passed over in her extended routes.

Entering more into detail as to the year's additions to hydrography, we have the following:—

Ireland.—Staff Commander Kerr and party, in a hired steam-vessel, have completed the examination of the off-lying shoal-banks between Greenore point and the Hill of Howth. By comparing this survey with that made by Captain Frazer, R.N., 1839–44, it appears that though the main forms of these banks remain unchanged, the loose surface material is constantly shifting, and that the swatchways through them are not to be permanently depended upon for navigation. Consequent on changes resulting from improvements made in the navigation of the Liffey river, Dublin bay has been re-sounded. Owing to the increasing importance of the trade with England, Lough Carlingford entrance and the approaches to Greenore have been re-examined, and some spots of shoal ground

missed in former surveys closely examined. Fifteen feet is now considered the ruling depth of the engineering cut at the entrance.

England.—The constant movement of the sands in the neighbourhood of that great coast thoroughfare, Yarmouth roads, rendered an examination of the Cockle and Hewett channels necessary, more especially as our heavy draught iron-clad Channel squadron, in their periodical coast-tour, visited this locality. Staff-Commander Parsons and staff, in the *Porcupine*, skilfully executed this service; the party then working southward from Walton Naze, closely sounded the several channels and approaches of the Colne and Blackwater rivers. Following up the close examination from the shores of the South Foreland to Dungeness in 1873, the survey from Dungeness to Hastings with the outlying shoals was then completed.

Staff-Commander D. Hall, in addition to the survey of Southampton Water and its approaches, has sounded out minutely Portsmouth harbour; considerable additions to the mooring-space having been effected by dredging-operations in the last few years.

Mediterranean.—A partial blank in the recent surveys of the coast of Sicily, arising from the withdrawal of the surveying-ship, *Shearwater*, to the Zanzibar coast, has been filled up. This blank was on the north coast, and extended from Castelamare bay, in the west, to Milazza, in the east. Aided in the topography by the Italian maps (equivalent to our own Ordnance Surveys), courteously afforded by the Sicilian authorities, and sounding off to the depth of 100 fathoms, Navigating-Lieutenant Millard, in a small hired yacht from Malta, completed this nautical examination of the Sicilian shores; a duty he had been engaged on as an assistant for several past years.

East Coast of Africa.—Lieutenant-Commanding Gray and officers in the *Nassau* have completed the coast-survey from Owvou bay in lat. 9° 38′, to Cape Delgado in lat. 10° 43′ s., including detailed plans of Kiswere, Mikindani, and Mto Mtwara harbours, Mchinga and Mikindani bays, with the Lindi and Mgau rivers. Coupled with the *Shearwater's* survey of 1873 and work now in progress, the shores of this district (comprising, as it were, the focus of the coast slave-trade) are on the eve of being well charted.

The sister surveying-ship, *Shearwater*, being compelled, from the sickness of the crew and the necessity of repairing damages, to visit the Cape of Good Hope, was subsequently diverted to carry the Rodriguez Transit of Venus party from Mauritius to that remote and little-visited island. Good service to this national scientific undertaking, in addition to aiding the disembarkation and arrange-

ments for the observing parties, was rendered by Commander Wharton and his officers. With a large number of chronometers, meridian distances were run in the *Shearwater* between Rodriguez and Mauritius; Captain Wharton further taking part in the Transit observations.

Our hydrographical knowledge of Rodriguez island, prior to the *Shearwater's* visit, was limited; and doubts existed in late years as to the extent seaward of the outlying, or rather fringing reefs. An excellent survey of the island, with its port, Maturin, and also of the surrounding dangers and the bank of moderate soundings encircling the island, was completed during the attachment of the ship to the astronomical party. After transferring the Transit of Venus observers and their stores to Mauritius, the *Shearwater* proceeded to resume her old work; examining the outlying islets Coetivy and Platte of the Seychelles group, as also the dangerous but little-known reef, La Perle, situated 11 miles seaward, or to the s.w. of Isle Platte. These useful examinations, and their reliable connection in longitude with Mauritius, together with a few well-placed deep soundings, made on the voyage to Zanzibar, form a useful addition to the Indian Ocean chart.

Japan.—Captain St. John, in the *Sylvia*, reached his surveying ground in July last; examining in the first place Sendai bay on the east coast of Nipon, in the hope of finding a harbour; according, however, to his report, "even an anchorage, except during north-easterly winds, is not to be obtained." Commencing the closer work at Itsiye Misaki, in the Kii Channel, the survey was advanced to Owasi bay, and in this spring will be continued to Matoya, and thence to Omae Saki. The weather on this part of the coast is generally boisterous and, as the main route between Yokohama and the Inland Sea here skirts the coast, good harbours are valuable. Fortunately, as Captain St. John remarks, "they are met with frequently."

Newfoundland.—Labrador Coast.—Navigating-Lieutenant William Maxwell and party, in a hired steam-vessel, steadily continue the examination in the early and late parts of the season, of the south coast of Newfoundland, advancing up the Labrador coast northward of Belleisle strait in the two available months of summer.

The east side of Placentia bay, chiefly undertaken this year to find a safe route for telegraphic cables, has been completed for a distance of 20 miles; and a detached examination of the following frequented harbours and anchorages, during the fishing-season, on

the Labrador coast, made:—Venison Tickle, Fishing-ship, Curlew, and Independent harbours.

In the river St. Lawrence, the channel south of Crane island was also thoroughly sounded by this surveying-party, at the request of the Government of Canada.

Jamaica.—This survey, carried on in a hired schooner, under Staff-Commander George Stanley, is making steady progress. The coast between Morant and Helshire points, including Port Royal and Kingston harbours, with the off-lying soundings, have been finished in close detail and are now in the hands of the engravers. Portland bight, with Old Harbour and approaches, are far advanced towards completion.

Barbuda.—In consequence of several official reports made by Lloyd's agent at Antigua as to the defective survey—by the present Admiral Barnett—of the fringing reefs of this island, and the outlying shoal-ground (it being assumed that the dangers extended considerably seaward of those published in the Admiralty chart, and that several wrecks had in consequence ensued), Navigating-Lieutenant Hoskyn was detached from the Jamaica survey to Antigua, to examine from that island the details complained of. Mr. Hoskyn's report confirms the accuracy of Admiral Barnett's survey in all particulars, and states that the exaggerated distances from the shore of these reported dangers have no foundation. It is to be regretted that these ill-considered reports, impugning the fidelity of charts that carry on their face the stamp of authenticity, should be made. Similar reports, especially in cases of wreck, have prevailed of late years; and considering the mischief which results by weakening the confidence of seamen, together with the labour, time, and expense bestowed to test these reports—in some cases requiring a ship to be specially detached from her regular duties—the time would appear to have arrived for legal action being taken against proved offenders in this particular.

Western Australia.—In the face of many difficulties, scarcity and unwholesomeness of water being added to the track passing over extensive barren tracks of sand, Navigating-Lieutenant Archdeacon and party have succeeded in surveying the coast-line between Swan River and Jurien bay, a distance of 120 miles. He has also completed a survey of Champion bay; this bay is one of the important ports of the colony, being the outlet of a great mineral district (lead, copper, and iron), and situated in the "middle of the granary of the colony."

South Australia.—This survey, under Staff-Commander Howard and one assistant, in a hired schooner, is progressing to the north and west; the examination of the coast and outlying soundings being now extended to Streaky bay from Cape Catastrophe. Port Adelaide has been re-surveyed on a large scale, and the Investigator group off Anxious bay undergone examination.

Victoria.—Staff-Commander H. J. Stanley and party have been chiefly engaged in re-sounding the various channels into Port Phillip: owing to increasing trade and reported natural changes, this special work was performed at the request of the Colonial Government; the results justified this fresh examination, though only ten years have elapsed since the elaborate survey by the late Commander Cox was made.

Staff-Commander Stanley has also commenced a survey of Banks strait; this strait has become a largely used highway, and requires close examination. Tasmania, within whose jurisdiction this survey lies, shares with Victoria the expense falling on the colonies. It may be here re-stated that the expenses of the marine surveys of the four Australian colonies are shared by Imperial and the several Colonial governments.

Queensland.—Staff-Commander Bedwell and assistant have now completed the coast northward of Cape Palmerston, in latitude 20° 20′ s., including Broad sound; the soundings extending to the Northumberland islands are in course of completion. The great range of tide, and the rapidity with which it runs, render the examination of this particular district both tedious and arduous. Increasing colonial traffic, however, repays the labour bestowed.

New Guinea.—Captain Moresby, in the homeward route in H.M.S. *Basilisk* from the Australian station, having been reinforced from the Admiralty by Lieutenant Dawson, a well-trained and active surveying officer, has, as notified in the last year's address, followed up the exploration of Goschen strait, and also the northern shores of New Guinea from thence to Cape Rigny, near Astrolabe bay. Pausing for a few weeks in the neighbourhood of the eastern extreme of New Guinea, the scene of last year's labour, Captain Moresby commenced a close examination of the channels leading through the numerous islands and reefs forming the western part of the chain of the Louisiade Archipelago.

This excellent survey, conducted by Lieutenant Dawson, leaves nothing to be desired in point of accuracy: continuing from the

south between Suckling reef of Stanley and Teste island of D'Urville, a navigable but tortuous channel exists, emerging into the deep water of Goschen and Ward Hunt straits. This channel, by the recommended track, is about 80 miles long; in some parts it is contracted by coral reefs to a width of 2 miles. Steam, daylight, and conning from aloft, would appear to be essential to its navigation.

Making a cursory but sufficient examination of the western shores of D'Entrecasteaux islands, Captain Moresby, ably seconded by Lieutenant Dawson and the officers of H.M.S. *Basilisk*, then commenced a survey of that uncharted, and so far unknown line of coast, extending thence to Cape Sud Est and Riche island of D'Entrecasteaux: and then continued the coast examination to Cape Rigny of Astrolabe bay. Riche island of D'Entrecasteaux was found to be a part of the mainland, the low flat country adjacent to it not having been in sight from the ship of that distinguished navigator; a line of barrier reefs situated 7 leagues eastward of the assumed island, it will be recollected, here baffled his efforts to reach the mainland.

The results of this exploration of the New Guinea north-eastern shores, following up those on the south-east coast (extending to the 142nd meridian) made by Blackwood, Yule, and Stanley in H.M. ships, *Fly*, *Bramble*, and *Rattlesnake*, 1844–51, and recorded by the able naturalists, Jukes and McGillivray in the published voyages of *Fly* and of *Rattlesnake*, London, 1847–52, have naturally formed subjects of interest to geographers, and will enrich the 'Proceedings' and 'Journal' of the Society. It is desirable here to state that the survey made of this coast in the *Basilisk*, although only what is termed a "running" one and on a small scale, depicts all useful features, and is creditable to the perseverance and professional skill of all concerned.

Deep-sea Exploring Expedition.—In further record of the proceedings of the *Challenger* :—

From Melbourne, in Australia, where we left her in March, 1874, after arrival from the sounding cruise to the margin of the pack-ice within the Antarctic circle, the ship visited Sydney, New South Wales, to be docked and refitted; proceeding in June through Cook Strait to Wellington, New Zealand, and thence by way of East Cape to Tongatabu, in the South Pacific, sighting the Kermadec group.

Visiting Ovalau, in the Fiji group, and making a survey of Kan-

davu, the then port of call for the mail-steamers between Australia, New Zealand, and San Francisco, the *Challenger* passed on through the New Hebrides cluster, briefly calling at Api, and proceeded to the settlement of Somerset, in Torres Strait, steering through the dreaded Great Barrier reefs by the Raine island passage.

Clearing Torres Strait in the early part of September, the ship touched successively at the Arru and Ki islands, Banda, Amboina, and Ternate in the Malacca sea. Quitting Ternate in the middle of October, and entering the Celebes sea by the passage between Bejaren island and the north-east point of Celebes, Samboangan was visited; thence through the Sulu sea to Ilo Ilo and Manila, in the Philippine group, arriving at Hong Kong on the 16th November.

At Hong Kong the *Challenger* underwent a thorough refit before quitting the port. In the early part of January of the present year the Arctic experiences of her captain, added to enlarged scientific and professional knowledge, pointed to the desirability of his taking command of the North Polar Expedition, now about to leave our shores. Captain Nares was thus superseded in the command of the *Challenger* by Captain Frank Thomson, parting with regret from an undertaking to the success of which he had largely contributed, and from associates whose esteem and good-will followed him to his present more onerous, and if possible, more responsible command.

From information subsequently received, the *Challenger*, on quitting Hong Kong, again proceeded south, passing through the Philippines, and visiting the island of Camiguin, in order to ascertain the temperature and depth of water under its volcano. This volcano lies on the western end of the island; the first eruption began on the 1st May, 1871, at about 500 yards from the water's edge, and on the same level; it has now attained the height of 1950 feet, with a proportionate base. Soundings in 190 fathoms with the usual average bottom temperature were obtained within a mile of the volcano: after some exploration in the neighbourhood of Samboangan, the ship passed into the Western Pacific. By telegram we have also received intelligence of the remarkable depth of 4575 fathoms having been obtained, assumedly off the north coast of New Guinea; Humboldt bay, in that island, being referred to as visited, as also Admiralty island. The *Challenger* is now engaged in Japan.

The results of this second portion of the voyage, ranging over 60 degrees of latitude, and embracing so many equatorial confined seas, continue to prove of special interest to physical and natural history science. On a trawling made amongst the Kermadec group

at a depth of 630 fathoms, Professor Wyville Thomson remarks that they were greatly struck with the general resemblance between the assemblage of animal forms brought up in the net and the results of a good haul in about the same depth off the coast of Portugal or North Africa: again, on the dredgings generally between New Zealand and the Fiji group, which, with the exception of one near the New Zealand coast, were all made at depths varying from 300 to 600 fathoms; he further observes "they tend to confirm the impression that even at these comparatively moderate depths, while species vary in different localities, and different generic types are from time to time introduced, the general character of the fauna is everywhere very much the same."

In the Arafura Sea no greater depth was found than 50 fathoms, and indeed generally little more than half that depth; the bottom a greenish mud, due apparently in a great degree to the deposit from the great rivers of New Guinea and those falling into the Gulf of Carpentaria. Animal life was not abundant, and many seemed dwarfed, the fauna having somewhat the character of that of a harbour or estuary: the specific gravity of the surface-water was also unusually low. The dredgings in the moderate depths of the Banda and Celebes seas were especially successful, and many new additions to science gained.

The serial temperatures observed in the course of this voyage between Australia and China were of great interest as developing the basin-like character of the several seas passed over. In the included space, Australia on the west, and from Sandy cape to New Caledonia, thence to the New Hebrides, Solomon, Louisiade archipelagos, and New Guinea on the south, east, and north, an encircling barrier, complete to a depth of 1300 fathoms, prevents free communication with the outer ocean. Several soundings, ranging from 2300 to 2650 fathoms, were obtained in this enclosed sea, the temperature in each instance, from a depth of 1300 fathoms to the sea bottom, being uniformly 35° Fahr.

Similarly, the Banda, Celebes, Sulu, and China seas, are enclosed basins, and their waters cut off from the general oceanic circulation. In each of these seas soundings exceeding 2000 fathoms were obtained, but after a certain depth was reached, the temperature below that depth remained the same. In the Banda and China seas the uniform temperature continued from 900 fathoms to the bottom, in the Celebes sea from 700 fathoms, and in the Sulu sea from 400 fathoms to the bottom; these uniform

temperatures in the four seas being respectively 37°, 36·2°, 38·5°, and 50·5° F.

Indian Surveys.—It is satisfactory to state that the resumption of the coast surveys of British India has, during the past year, been taken in hand by the Indian Government, and cordially supported by the Lords of the Admiralty. A detached party of naval surveying officers, consisting of Staff-Commander J. H. Ellis, Navigating Lieutenants Coghlan, Jarrad, Hammond, and Navigating Sub-Lieutenants George and E. W. Petley, have been placed at the disposal of the India Office, and under the immediate direction of the Superintendent of Marine Surveys, Commander A. D. Taylor, an experienced surveying officer of the former Indian Navy, and who has for some time past been maturing plans for this much-needed work. The surveys to be undertaken will embrace the seaboard of British India from the Pakchan River (in Tenasserim) on the east, to Karáchi (on the coast of Sindh), on the west, including the various groups of islands in the Bay of Bengal, and the Maldivh and Lakadivh Archipelagoes.

Staff-Commander Ellis has been appointed as senior deputy to Captain Taylor. He is an officer of great experience.

The headquarters of the Survey have been established at Calcutta, and the work of equipping the necessary vessels is, it is understood, being proceeded with—one party has already broken ground at the Lakadivh Islands.

Summary.—In addition to the current work of the Admiralty Hydrographic department in issuing nautical notices, tide-tables and lists of lights, a new catalogue of the 2620 Admiralty charts has been published. During the year thirty-nine charts have been cancelled and replaced by more perfected works. Among the new charts issued may be more specially mentioned a series of four, embracing that part of the Pacific Ocean between the parallels of 37° N. and 37° S., and extending from the Philippine islands, Celebes, New Guinea, and Australia, on the west, to San Francisco and Easter island on the east. In the compilation of this series the authority for and verification in position of each islet and danger have again been carefully tested, and every reliable source of information, to the most recent date, collated. Navigators are greatly indebted to the painstaking hydrographic labours of the officers of the United States navy in this special field of research, as shown

in the successive editions of 'Reported Dangers to Navigation in the Pacific.'

Of the charts published, two sheets on the east coast of Africa, extending from Panjani bay to Rás Kimbiji, including Zanzibar island and its approaches, with several plans of anchorages thence to Cape Delgado, are deserving the attention of geographers; as does also a chart of the Makrán coast (Maskat to Karáchi): and on our own shores, plans of the Menai Strait; and the coast with its navigable channels, from Orfordness to Cromer. In the South-Indian Ocean the requirements of the observing parties for the Transit of Venus at Kerguelen Island, and the ships-of-war detailed for the service, demanded special charts of that region and also of the neighbouring islands Prince Edward, Crozet, Heard, and M'Donald. The American and German government ships deputed for the same service profited by these timely publications.

Charts of Davis Strait, Baffin Bay, Smith Sound, with Kennedy and Robeson channels, together with several plans of ports on the west coast of Greenland, from the latest authorities, have also been prepared for the Arctic Expedition.

In all fifty-six new charts and plans have been published during the year, and 190,500 printed for the Royal Navy and general public.

Revised editions of the 'Channel Pilot,' part ii., 'South American Pilot,' part ii., and 'New Zealand Pilot,' have been published, together with the following new works:—'China Sea Directory,' vol. iii., comprising the coasts of China from Hong Kong to Korea, with Formosa and the other outlying islands; 'Persian Gulf Pilot,' a supplement embracing the Makrán coast; also 'Hydrographic Directions for Davis Strait and the West Coast of Greenland.'

Arctic Exploration.—Unquestionably the most important subject on which I have to address the Society on the present occasion is that of Arctic Exploration, especially with regard to the progress made in the great question of the resumption of Arctic Research by England since the Anniversary Meeting last year. When my predecessor, Sir Bartle Frere, reviewed the position of Arctic matters last June, as you all remember, the question of Government action, owing to a change of Ministry, remained in abeyance, and it was stated that the Council proposed to bring the matter again before the present Ministers. Accordingly, in July, accompanied by Dr. Hooker and Admiral Sherard Osborn, I had

the honour of waiting on Mr. Disraeli, and explaining our views to him in detail; and on this occasion I received his assurance that the question should be fully reconsidered during the Recess. Later in the year I addressed to him the following letter:—

"Dear Mr. Disraeli, October 12th, 1874.

"The late announcement of the success of the Austrian Exploring Expedition under Lieuts. Weyprecht and Payer in discovering land to the north-west of Spitzbergen as high up as 83°, which is the point nearest to the Pole yet sighted on the face of the earth, has excited an intense interest throughout Europe, and especially amongst our own Arctic Geographers, who have in consequence besieged me on all sides with enquiries as to the fate of the application which I had the honour to make to you in last July, relative to a proposed Government Expedition which should leave our shores for the Arctic Seas in the course of next spring, and should endeavour to reach the Pole by way of Baffin Bay and Smith Sound. You were good enough to say at the time that you should take the matter into consideration, and would consult those departments of the Government which were interested in the question, and it is with reference to this promise that I now again venture to address you. May I announce to the Council of the Royal Geographical Society, whom I shall have to meet in a very short time, at the opening of our Autumn Session, that the papers relating to the proposed Expedition, which were handed over by Mr. Gladstone's Secretary to Mr. M. Corry, have been laid by you before the present Board of Admiralty for consideration and Report? or may I, at any rate, state that this preliminary step will shortly be taken? Pray excuse any appearance of impatience; but the Naval Authorities on my Council, who have urged me again to write to you, assert that the whalers are now returning from the Polar Seas, and that if there is any prospect of an Expedition such as is proposed in the papers above alluded to being sent out in the course of next spring, it is full time that local enquiries were made, and measures taken to obtain one or more of these vessels, and to secure the services of seasoned crews and officers. I have only further to mention that the Council of the British Association, on the recommendation of a Committee of Section E, are about to pass a resolution which will in due course be laid before you, strongly supporting our prayer for a new Arctic Expedition in 1875 as an almost indispensable sequel to the cruise of the *Challenger.*

"I remain, dear Mr. Disraeli,

"Yours most faithfully,

(Signed) "H. C. Rawlinson,

"President of the Royal Geographical Society.

"*The Rt. Hon. B. Disraeli.*"

All the papers submitted by us to the Government, were soon afterwards referred by Mr. Disraeli to the Board of Admiralty for examination and report, accompanied by an important new chart of the Polar Regions, by Captain Evans, the Hydrographer, on which the portions discovered by the various nationalities were marked by distinctive colours; the result was, that I was favoured on the 17th of November by the receipt of the following letter:—

"DEAR SIR HENRY RAWLINSON,

"Her Majesty's Government have had under consideration the representations made by you on behalf of the Council of the Royal Geographical Society, the Council of the Royal Society, the British Association, and other eminent scientific bodies, in favour of a renewed Expedition, under the conduct of Government, to explore the region of the North Pole; and I have the honour to inform you that, having carefully weighed the reasons set forth in support of such an Expedition, the scientific advantages to be derived from it, its chances of success, as well as the importance of encouraging that spirit of maritime enterprise which has ever distinguished the English people, Her Majesty's Government have determined to lose no time in organising a suitable Expedition for the purposes in view.

"I remain yours faithfully,

"B. DISRAELI.

"*Major-General Sir Henry C. Rawlinson, K.C.B.*
&c. *&c.* *&c.*"

The decision of Her Majesty's Government was no sooner communicated to the Admiralty than energetic steps were immediately taken to hasten the preparation of a Polar Expedition, so that it should be in a position to leave this country at the proper season in 1875.

Officers were dispatched to examine the men-of-war in reserve, as well as our mercantile whaling fleet, for two vessels strong and fit for navigation in Polar Seas; and on the 24th November, 1874, the Admiralty appointed three experienced Arctic officers* to form a Committee to report on the following points:—

The scope of the proposed Expedition and what instructions should be given to its leaders. The description of ships to be employed, and the various kinds of boats, sledges, fittings, stores, provisions, and clothing with which it was to be equipped. And, lastly, to recommend such arrangements as were advisable for preserving the health of the officers and men to be employed.

That Committee by the 14th February, 1875, had completed its labours, and made a lucid Report embodying its recommendations on all the points referred to, a Report which has been subsequently presented to both Houses of Parliament; but within a few days of its assembling the important question of the selection of the ships was decided, and the Admiralty authorized the immediate strengthening of H.M.S. *Alert*, 1045 tons, 381 H.P., and the purchase of the whaler *Bloodhound*,† about the same size, which was likewise immediately prepared for Arctic service. At the same

* Rear-Admiral George H. Richards, C.B., F.R.S.; Rear-Admiral Sir Leopold McClintock, K.C.B., F.R.S.; Rear-Admiral Sherard Osborn, C.B., F.R.S.

† Re-named *Discovery*.

time the Admiralty decided on appointing to the command of the Expedition, Captain George Nares, R.N., F.R.S., the distinguished officer then commanding the *Challenger*, and he was immediately ordered home from Hong Kong.

Acting on the recommendations of the Committee, it was decided that the two ships should be manned and officered with complements, all told, of 121 souls; and it is calculated that the ships could stow on leaving England three years' provisions for the entire cruise, and a fair amount of fuel for their engines.

In February 1875, Captain Nares arrived, and had no difficulty in selecting his officers, as of lieutenants alone there were more than sufficient volunteers to have manned the Expedition. Throughout the past spring the Expedition has been most carefully equipped, travelling gear, and provisions prepared in the most elaborate manner; and it is not too much to say that never has an Arctic Expedition been equipped in so methodical and liberal a manner, and, so far as the Admiralty is concerned, no expense or care has been spared to ensure the most perfect safety and success.

The scientific objects for which this Expedition has been so especially dispatched to the Polar Seas have been kept steadily in view. Every officer has been carefully trained to labour in some branch of science, and the Royal Society have been allowed to name two persons whom they deem especially qualified as naturalists, one of them being embarked in each of the ships. The Expedition leaves England a few days hence, accompanied by an extra ship (the *Valorous*) as far as Disco, in Greenland, so as to complete the two vessels with fuel and stores at the very threshold of their labours.

The instructions given to Captain Nares are not yet officially public; but it may be considered pretty certain they will not deviate from the recommendations of the Arctic Committee, and I assume, therefore, that we may consider the following as the programme:—

The *Alert* and *Discovery* leaving Disco some time in July, will proceed leisurely up Baffin Bay, following the East Coast up towards the entrance of Smith Sound in 78° N. They need not hurry, for previous navigators have never found the ice cleared out of that strait before the first week in August. On reaching its entrance they will make for Littleton Island, and there place records of their progress, and Captain Nares will then decide whether that island, with its adjacent shelter of Port Foulke, is to

be the real base of his operations, or whether some better spot on the west side of the entrance can be selected; and his decision is to be recorded in the dispatch to be there left.

To this point, if nothing is heard of the Expedition in 1876, a ship will be dispatched by the Admiralty in the summer of 1877, to act as a depôt for the Expedition to fall back upon in case of any untoward accident to the vessels composing the Expedition.

According to the state of the ice in Smith Sound, Captain Nares will then push up north for a headland named Cape Fraser, avoiding the great elbow on the east side about Humboldt Glacier; but experience tells us that it is not likely he will find open water within Smith Sound much before the middle or end of August; and Arctic experts assure us that much of the success of this Expedition depends upon the patience and judgment of the leader at this crucial point of the voyage.

The ice of Smith Sound must be allowed time, according to the season, to clear out into Baffin Bay, and an impatient dash into this outflowing-pack may lead to the regretable accident of the ships being caught in it, and swept either on shore, or down with the ice-stream throughout the following winter into the Arctic Ocean. Happily, Captain Nares' past Arctic experience will keep him fully alive to this danger. On the other hand, winter will now be fast approaching; and it will be a race against time, in which we can only hope Providence will so far favour our seamen that, what the Americans, in Hall's Expedition, were fortunate enough to accomplish, may be granted to H.M.S.'s *Alert* and *Discovery*, and that in lat. 81° 30′ or 82° N., about Hall's farthest point, good winter-quarters may be secured for one ship on the Greenland shore. The *Alert* now alone will tackle to her work, and in whatever days of mild weather or open water may remain in September, struggle to reach a position well to the north of, but not exceeding 200 miles from her consort. By this means, and with intermediate depôts of provisions, it is calculated that the safety of the crews in their retreat, should it be necessary, to Baffin Bay will have been secured.

The advance-ship it is expected, with its crew strengthened by a portion of that of the depôt-ship, will have at least six strong sledge parties and four dog-sledges, with which to attempt the accomplishment of the main object of the Expedition, that is, reaching the North Pole. But it must be borne in mind that sledge-travelling has never yet been found practicable over any

considerable extent of open frozen sea, and that everything depends upon the conditions of land and water that may be found in the progress northward. The sledge-operations will commence from the advance-ship, should it have attained the high northern latitude here indicated, in early spring; and all the sledge companies will be employed in the first instance in pushing forward the North Pole party, which will be provided with at least one boat, before attending to any other exploration. Meantime communications will be kept up, if possible, by means of dog-sledges between the two ships, and Captain Nares will rejoin his consort towards the end of the summer of 1876, if his parties have returned with reasonable success from their spring journeys towards the Pole. In the latter eventuality, and if no serious accident happens to either ship, both vessels will return to England in that year; but if another season should be absolutely necessary in order to complete a reasonable amount of exploration, it may be necessary for the advanced ship to fall back towards her consort, or for the latter to retreat to a more southerly position whence a final withdrawal might be more certainly effected. Regarding these and other points, the instructions furnished to Captain Nares leave him a free choice of action, according to the circumstances that may arise.

Our own Expedition naturally occupies the largest share of our attention as far as Arctic matters are concerned, but I must not neglect to notice the increased attention now shown by civilized nations generally to Arctic enterprise. The pages of the well-known periodical, the 'Geographische Mittheilungen,' of Dr. Petermann, have been again this year largely occupied by articles, illustrated as usual by excellent maps, on the results of recent Expeditions and on projects of new Expeditions. Thus Professor Höfer, the geologist of Count Wilczek's voyage, contributes a paper on the Structure and Glaciers of Spitzbergen and Nova Zembla, and Dr. Chavanne two papers on Currents, Winds, State of the Ice, &c., as bearing upon the choice of a route for reaching the Pole. Since our last Anniversary the return of the Austrian Polar Expedition from the Nova Zembla Sea, bringing news of its narrow escape from the drift-ice, in which the crew was obliged to abandon their ship, and the discovery of new Polar lands, thoroughly roused public feeling throughout Europe. It is scarcely necessary to review here the incidents of this voyage, which you heard, on the first night of our Session, from M. Julius Payer, the second in command. Suffice it to say that the Expedition was determined

on in consequence of the success of Messrs. Weyprecht and Payer in the previous summer of 1871, in reaching, in a small hired vessel, a very high latitude in the Nova Zembla Sea, and finding there open water to the eastward, which led to the hope that, in spite of the adverse experience of centuries of enterprise in this direction, a passage towards Behring Straits might be found by the north of Nova Zembla. A national subscription was started in Hungary and Austria in the succeeding winter and spring, and the new Expedition, under the same officers, set sail from Tromsö in the schooner *Tegethoff*, in July, 1872, bound, not for the Polar area, but for the supposed open route past the shores of Siberia. The season proved much less favourable than in the previous year. The *Tegethoff* was caught in the drift-ice not far from the shores of Nova Zembla, and carried with it throughout the winter and the following summer, first north-east and then north-west, until it grounded on the threshold of a tract of new land or islands, in 80° N. lat. The exploration of the shores of this new Polar land by a sledge-party, under the command of M. Payer, in the spring of 1874, was the geographical result which attracted the most attention at the time. But the observations in all branches of physical science made by Lieutenant Weyprecht, and which he is now preparing for publication, will also stamp this Expedition as one of the most fruitful in important results. A summary of his work has already been published in Heft 2 of Petermann's 'Geographische Mittheilungen' of the present year, and the track of the *Tegethoff* has been elaborately worked out by Admiral Wüllerstorf-Urbair, in the 'Denkschriften der Kais. Acad. d. Wissenschaften,' Meeting of the 10th December, 1874. Translations of both these Memoirs will be published in the next volume of our 'Journal.'

Whilst our National Expedition has been completing its final preparations, another English Arctic Expedition has been quietly equipping, with the intention of following a westerly route from Baffin Bay, and, if possible, of recovering some of the lost records of Franklin. Little at present is publicly known of this spirited undertaking, and I must limit myself here to mentioning that the name of the vessel is the *Pandora*, and that its commander is our Associate, Captain Allen Young, who distinguished himself in Arctic travelling when sailing-master under McClintock in the *Fox*, in 1857–9.

An Expedition of great interest is about to leave the shores of Sweden next month for the Kara Sea and the mouths of the Obi

and Yenissei. It will be under the command of that experienced Arctic traveller and eminent savant, Professor Nordenskiold, and has been equipped chiefly through the munificence of M. Oscar Dickson, of Stockholm. It is Professor Nordenskiold's intention to quit his vessel near the mouth of the Yenissei, and to return home by land.

Our associate, Mr. Joseph Wiggins, of Sunderland, is also about to make another voyage this year to the Kara Sea and the embouchure of the Obi, and hopes to be able to discover a practicable commercial route to the Russian settlements on the lower course of that river.

Before quitting the subject of Arctic Geography it is necessary to record that, in order to place the best existing information regarding the regions to be visited in the hands of the officers of our Expedition, the Council determined on the publication of a volume of papers on the Physical Geography and Ethnology of Greenland and the neighbouring Lands. This volume is now nearly ready, and a number of copies will be sent to Captain Nares shortly before he sails from Portsmouth. It consists chiefly of reprints of a number of papers which have appeared at various times in the Transactions of Societies; but one of the most important is an original work from the pen of Admiral Collinson. Our Secretary, Mr. Markham, who has so materially contributed by his writings and activity to the revival, which we now witness, of public interest in Arctic Discovery, and to whom the suggestion of this publication is due, has arranged its contents. It was originally intended to embrace information in other branches of science; but the Royal Society, when invited by us to co-operate, considered very justly, and with our entire consent, that the physical and biological portions of the work might be better treated separately and undertaken by them. The result is, therefore, two volumes of reprinted and original papers and memoranda, both of which it is hoped will be found useful by Captain Nares and the officers under his command.

EUROPE.—According to the list given in Dr. E. Behm's excellent Geographical Annual (Geographisches Jahrbuch) for 1874, there were towards the end of last year no fewer than 23 Societies in Europe exclusively devoted to Geography. The most recent of these, the Société de Géographie de Lyon, was founded in January 1873, and under the presidency of its founder, M. Louis Desgrand, has already become an active and important institution,

numbering 317 members. The Italian Geographical Society continues its career of prosperity; its muster-roll now reaching the large total of nearly 1400 members. Although the veteran geographer, the Commendatore Cristoforo Negri, no longer presides at its councils, an active spirit prevails in its management; and I shall have, in another portion of this Address, to record the project of an expedition into Central Africa, from the southern borders of Shoa through the Galla country, which it has originated, and for which it is now endeavouring to procure the necessary funds by national subscription. Meantime it contributes annually various grants in aid of other expeditions, including the important one of Dr. Beccari to Celebes and New Guinea, to which my predecessor alluded in the Address of last year. In the north of Italy the zealous young geographer, Signor Guido Cora, has been elected President of the Turin Society, the *Circolo Geografico Italiano*, which numbers 140 members. Signor Cora himself has occupied his summer holiday in practical geography, having exchanged his pen for the sextant and barometer; and having crossed the Adriatic to Albania, where he has carried on a survey on a scale of 1 : 100,000 in the almost unknown interior of the country, ascending the previously untrodden summit of Mount Kudusi (6465 feet high), and tracing the river of Berat to its hitherto unknown sources in the province of Kolonia.

Russian Exploration in Central Asia.—The Imperial Russian Geographical Society continues to increase in numbers and efficiency. On the 8th January, 1875, it numbered 1185 on its list, composed of 30 honorary members, 3 foreign honorary members, 37 foreign corresponding members, and 447 members of the affiliated societies of Siberia, the Caucasus, the North-western Provinces, and the South-west. On examining the balance-sheet of this society, we find that in 1874 it received a subsidy of 15,000 roubles (about 2000*l.*) from the State treasury, and that the subscriptions of its members amounted, in the same year, to 2950 roubles (about 400*l.*). Besides these ordinary sources of revenue, its extraordinary revenue was augmented by grants from the State treasury and from private individuals for special objects. Thus in 1874 a sum of 20,000 roubles (2800*l.*) was given by the Government to defray the cost of the Amu-daria Expedition, of which about half was devoted to meteorological investigations on the Lower Oxus. 15,200 roubles (2000*l.*) were given by Golubkoff for the publica-

tion of a Russian edition of Ritter's 'Asia;' and 10,000 roubles (1400*l.*) by the State for the levelling of the Ust Urt between the Aral and Caspian seas.

During the past year no less than 6 important expeditions were under consideration, viz.:—

1. The Amu-daria expedition.
2. The expedition to level the Ust Urt, between the Aral and Caspian seas.
3. To investigate the Usboi, or dry bed of the Oxus.
4. The Olonek expedition.
5. Mikluko Maklay's exploration of New Guinea, and
6. Ogorodnikoff's journey in North-eastern Persia.

1. The first of these expeditions, an account of which will be found below, was organised by a special committee, with the co-operation of General Kaufmann, and received the Imperial sanction.

2. The second successfully accomplished its work, with the aid of a staff of trained surveyors, under the command of Colonel Tillo. They ascertained the height of the Aral Sea * to be considerably greater than previous observations had reported it to be: and thus claimed to have established the possibility of diverting the Amu-daria into its former channel, which debouched in the Caspian; and, lastly, they described the configuration of the Ust Urt plateau, which is not so flat as was supposed, between the Aral and the Caspian. Its greatest height is about 15 miles west of the Aral, where it attains an elevation of 519 feet above that sea, or about 677 feet above the level of the ocean. Hence it gradually slopes towards Lake Kerbulak; that part which includes Lakes Asmantai and Sam is only about 100 feet above the level of the Aral (343 above the Caspian), and forms a hollow which opens out at Mertwi Kultuk Bay; while the belt of higher ground near the Aral, about 35 to 40 miles wide, unites the northern Chink with the Ust Urt proper.

3. The expedition to investigate the Usboi, or desiccated bed of the Oxus, was indefinitely postponed for political reasons.

4. The Olonek expedition during the course of last year surveyed the lower Tungusska; reporting on the hydrography and topography of that region, and making some important changes in

* The mean of two series of levellings across the Ust Urt from the Aral to the Caspian gives 74 mètres, or 243 ft. Eng., as the difference between the height of these seas. According to Berg's measurement, in 1826, the height of the Aral above the Caspian was estimated to be only 117 ft.

its cartography. Müller, who was attached to this expedition, conducted a series of magnetic observations, which refute the theory of the Swedish professor, Gauss, as to the position of the Siberian magnetic pole, which was placed by him in about 71° N. lat. and 119° 20′ E. long. from Greenwich, *i.e.*, according to the map, very near the River Olonek. Müller discovered that, as he travelled in a north-easterly direction from the River Moniero, towards the Olonek, the magnetic intensity diminished. His observations coincide with those of M. Dové, Hansteen's companion, and he assigns, therefore, as the probable position of the magnetic pole some point between Vilnisk and Olonek, approximately between 64° and 65° N. lat. and about 112° 20′ long. E. of Greenwich, or nearly 7° S. and 7° W. of the position assigned by Gauss.

The Olonek expedition will be continued this year, during which explorations will be made in the basins of the rivers Hatanga and Anabara.

5. Mikluko Maklay's explorations on the Papuan Koviai coast of New Guinea have been mentioned before.

6. Lastly, Ogorodnikoff was compelled to return home after proceeding as far as Meshed, whither he travelled by the well-known high road, which passes through Astrabad, Shahrud, Sebzevar, and Nishapúr. The reason assigned for the abandonment of his meditated journey eastward was the disturbed state of Afghanistan.

The ethnographical map of Russia, edited by Rittich, was completed last May, and, together with the same author's ethnographical map of the Caucasus, is the most important and best-executed work of the kind ever produced in Russia. One of the first engraved copies will be exhibited at the Paris Exhibition this year.

Another important work has been the publication of Prejivalsky's travels,* the first volume of which, containing the general narrative and particulars regarding the geography, ethnology, and botany of the countries visited, appeared at the commencement of this year; and will be followed next year, and the year after, by two more volumes, comprising the more strictly scientific results of the expedition. The Council of the Russian Geographical Society have voted 10,000 roubles (1400*l.*) towards the expense of publishing these travels, which, it will be remembered, were prosecuted into Northern Thibet, almost to the foot of the great mountains,

* 'Mongolia and the Country of the Tanguts.'

into regions unvisited by Europeans since the journey of the Abbé Huc and Gabet, and of which our knowledge is very insufficient.

A work of a similar nature, viz. the Travels and Researches of the late M. Fedchenko in Turkistan, is being published by Madame Olga Fedchenko, the widow of the traveller. The 3rd Part of vol. ii. was published in 1874, and Part 4 in the present year. These parts, each of them forming considerable volumes in quarto, and richly illustrated with coloured plates, form the scientific Appendices to the narrative, and the work will constitute, when completed, a lasting monument to the memory of a promising young traveller too early lost to science and his country.

Another important publication during the past year was the translation into Russian of Ritter's 'Iran,' annotated by the well-known geographer, M. de Khanikof, and supplemented by some important articles by Professor Spiegel on the cuneiform inscriptions of Persia.

In my opening Address at the beginning of this Session, I alluded to the Amu-daria Expedition, some further details of which may be found interesting.

It will be remembered that in the end of May, last year, all the members of the Expedition were assembled at Kazala, on the Syr-daria, whence they proceeded in two steamers (the *Peroffsky* and *Samarkand*) by the Aral Sea to the delta of the Amu-daria, which they entered by the Kitchkineh-daria mouth, and ascended the Ulkun-daria for a distance of 55 miles from the bar without any great difficulty, finding the depth of channel to vary from 3½ to 8 fathoms. Above this point the river divides into numerous channels, which cause a great waste of its waters and increase the difficulties of navigation. Ascending by one of these channels as far as Mount Koshkana-tau, the passengers landed, as further progress was impossible, owing to the shallowness of the stream and the thick growth of reeds which fill the bed of the river.

Here it was decided to divide the surveyors into three parties,*

* The first party took an easterly direction, descending the Purhan Channel to the mouth of the Yani-su, and thence along the sea-shore past the fort of Ak-Kala to the mouth of the Taldyk; the second also proceeded east to the Purhan, then up this stream and the Kuvan Djarma to Nukus, thence descending to Ak-Kala, and thence by the Souma Channel towards Kungrad, and past that town to the mouth of the Taldyk; the third went to Kushkana-tau, and by the bank of the Ulkun-daria to Ak-Kala, returning to Kushkana-tau and by Nukus to Meshekli, on the Bokharian frontier.

to each of which was assigned a certain task which, it was surmised, would take from 105 to 120 days to fulfil. In the mean time, as it was of the utmost importance to find a navigable channel from the embouchure of the river to its upper course, the steamer *Peroffsky* was directed to descend the river, coast along the shore to Tustchibas Bay to the east of the delta, and endeavour to make her passage up the Yani-su and Kuvan-Djarma to the main channel of the river near Nukus. In this she was perfectly successful. On the $\frac{18\text{th}}{30\text{th}}$ July the *Peroffsky* crossed the bar of the Yani-su, and on the $\frac{24\text{th July}}{5\text{th August}}$ arrived at Nukus, after meeting Colonel Stolétoff and Major Wood, R.E., at Lake Dau-kara. From Nukus to Petro-Alexandroffsk, and from thence to Meshekli, on the Bokharian frontier, the navigation was comparatively easy.

Thus was inaugurated a work, the importance of which it is impossible to overrate, promising, as it does, to make the Oxus once again a great commercial highway, and thus to open a new era of civilization and progress, under the auspices of Russian rule, for ancient Kharesm, after so many centuries of slumber and decay.

The work of surveying was actively prosecuted in the whole delta defined by the Chartam-bai and Ulkun-daria on the one side, the sea-coast on the other, and the Yani-su and Kuvan-Djarma on the third. Levellings were further continued along the Yani-daria to Peroffsky, on the Syr, and up the Amu-daria to Meshekli.

We must now briefly notice some of the labours of the other members of the expedition. Before leaving Kazala, MM. Severtseff and Smirnoff had the misfortune to lose, by death, the topographer attached to their party, and after vainly trying to replace him, they set out on the $\frac{12\text{th}}{24\text{th}}$ June for the west shore of the Aral Sea. Their chief object was to correct and supplement Severtseff's previous observations in 1857 on the desiccation of that sea. They have now established beyond doubt the fact of the continuous decrease of the Aral Sea, as its waters recede from the west shore. Large bays, marked on previous maps as full of water, are now dried up, and in some places overgrown with brushwood. Old shore-lines are distinctly traceable by the different belts of vegetation which mark the more or less recent period at which they were left uncovered by the sea. A curious circumstance may here be noticed with regard to these explorations which may interest physicists, viz. that the wells

nearest the sea-shore, in some cases so near as almost to be within the wash of the waves, contained fresher and purer water than those at a little distance inland. This apparent anomaly is thus explained by Severtseff:—These wells are supplied from two sources: 1. The sea-water filtering horizontally through the sand. 2. The aqueous atmospheric deposits (*e. g.* rain and snow) on the land. These two elements of supply, freed from salt by a natural process of filtration, combine to produce excellent drinkable water; but as soon as the sea has receded a little distance from the wells, and sandbanks are formed which obstruct the drainage of the land, the well-strata (which are at an inconsiderable depth) become saturated with salt and do not admit of the filtration of the water, which then becomes bitter and unpalatable to the nomads, who desert these wells for others nearer the sea. With reference to that vast expanse of hillocky sand marked on our maps as the Kizil-Kum (comprising the region bounded on the north and north-east by the Syr-daria, on the east and south-east by the hills in the north of the Khanat of Bokhara to the right of the valley of the Zarafshán, on the south by the lower Amu-daria, and on the west by the Aral), forming, in pre-historic times, part of the bed of a great sea, which has since been gradually transformed into dry land by a similar process to that which is now in operation on the east shore of the Aral sea, the Russian savant Severtseff assigns three successive periods:—(1.) The formation of the dunes or sandbanks by the action of the waves; (2.) The growth of brushwood, clumps of tamarisk being the first to appear; (3.) The gradual covering of the whole with sand-drift, which is continually encroaching westwards as the sea recedes.

For a critical study of the whole question of the Aralo-Caspian plains, I can refer the reader to Baer's 'Kaspische Studien,' where the subject is exhaustively treated. I will only add that it is greatly to be desired, in the interests of science, that the Russian Government should cause an accurate topographical survey to be made, with as little delay as possible, of the east shore of the Aral, so as to enable future explorers to conduct their observations on a sure basis.

M. Soboleff, another member of the Amu-daria Expedition, has communicated some interesting particulars of the results of his ethnological and historical enquiries. On arriving in the Delta his first visit was to Chimbai, 30 miles overland from Kushkana-tau, the central gathering place of the Karakalpak tribe, and one of the

most important market-towns on the Lower Amu-daria, ranking next in importance after Urgendj, in the Khanat of Khiva, and visited by as many as 7000 people. Soboleff directed his researches to the east and west of Chimbai; he noticed that all the ruins to the west of Kushkana-tau were of comparatively recent construction, and had been destroyed within the last few years, while those to the east of Chimbai seemed to be of high historical interest. Such, for instance, are the ruins of the town of Ak-kala (7 miles east of Chimbai), formerly the seat of the Uzbek tribe of Masyd, and destroyed by Nadir Shah in the first half of the eighteenth century; and, secondly, the town of Bagdad, 20 miles to the east of Chimbai, also demolished by the Persian invaders. Soboleff confirms the opinion entertained by some geographers before the late explorations that the Yani-daria (*i.e.* new river) is of most ancient origin, and served at one time to unite the Jaxartes with the Oxus.

Whether it will be possible in the future to re-unite these great rivers and utilize their combined streams (still further swelled by an economical system of irrigation in the Khanat of Khiva) in diverting the Oxus into its old channel, so as to establish uninterrupted communication between the heart of Central Asia and European Russia by the Volga and Caspian, is one of those questions not only of the highest interest to all geographers, but one which, allied with a great many others, closely touches the supremacy of Russia in her lately acquired possessions, and indirectly affects the future prosperity of the whole continent of Asia.

It may be remembered that some years ago I was engaged in a sort of amicable controversy with my predecessor in this chair on the subject of the hydrography of the Aralo-Caspian basin, and that Sir Roderick devoted no less than 14 pages of his Anniversary Address for the year 1867 to an elaborate refutation of my views regarding the former desiccation of the Aral Sea. It is unnecessary at the present time to re-state the arguments, drawn from a very extensive examination of contemporary records, which led me to believe that, at different periods of history, the Oxus and Jaxartes having been drained off into the Caspian, the bed of the Sea of Aral had been dried up by evaporation; but I may say generally, that the result of the Russian topographical surveys, and especially of the levelling operations undertaken about the delta of the Oxus, has been to confirm my previous views. I now see very good ground for believing that the original course of the Oxus having passed in a westerly direction to the Caspian, between the 39th and

40th parallels of latitude, and the Jaxartes having flowed into the same sea along what is now called the Usboi, the Greek geographers, who navigated the Caspian, were right in laying down independent mouths for the two rivers and in measuring the distance between them. The whole subject, however, of the Aralo-Caspian hydrography will very shortly be brought before this Society in an exhaustive paper which Major Herbert Wood, Colonel Stoletoff's companion in the recent Russian survey, has submitted to the Council for publication in our 'Journal,' to which I propose to append a series of extracts from the Oriental geographers that have never been before translated. As the fullest information on all details of the physical, as well as the comparative geography of these regions will thus be very shortly in the hands of the Fellows, it seems unnecessary to anticipate the interest of Major Wood's paper by a further reference to the Russian discoveries.

Palestine.—Major Wilson (Director of the Topographical Department of the War Office) informs me that the survey of Palestine has made satisfactory progress during the past season, notwithstanding constant interruption from the state of the weather during a season of unusual severity, and the illness of several members of the surveying party. The triangulation has been extended southwards from Hebron to Beersheba, and the position of the wells at the latter place has been accurately determined, giving a fixed point of departure for the route surveys of travellers in the Negeb and desert, and affording satisfactory proof of the general accuracy of Messrs. Palmer and Drake's survey, which was based on the Ordnance Survey of Sinai.

The district covered by the triangulation, which includes the wilderness of Judah and the hill country between Hebron and Beersheba, has been surveyed and plotted on a scale of one inch to a mile. The examination of this section of the country, which has rarely been visited by travellers, has yielded very valuable results; numerous ancient sites have been recovered, and great light has been thrown on several difficult questions connected with Biblical topography. Some of these results have already been published in the quarterly statements of the Palestine Exploration Fund, whilst others await publication. The survey is now in progress in the plain of Philistia, and Lieutenant Conder, R.E., who has entire charge of the survey operations, hopes to complete the survey of

the whole of Palestine lying west of the Jordan during the spring of next year.

At the last meeting of the British Association at Belfast a sum of 100*l.* was granted for the special object of ascertaining accurately the depression of the Sea of Galilee, by a line of levels from the Mediterranean, and the actual fall of the Jordan from the lake to the Dead Sea. Instruments have been lent for this purpose by Lieutenant-General Sir Henry James, R.E., and the work will probably be commenced in June.

The Palestine Exploration Fund have to deplore the loss of Mr. C. F. Tyrwhitt Drake, who died in harness at Jerusalem in June last, from fever contracted during the progress of the survey, and it is hardly possible to over-estimate the services which he rendered to the fund. Amongst the obituary notices will be found a record of Mr. Drake's contributions to geography. The survey has also lost the services of Sergeant Black, R.E., invalided from ill-health, who has from the commencement taken a prominent part in the triangulation of the country, and who for some time was in sole charge of the survey. On the death of Mr. Drake, Lieutenant Kitchener, R.E., was appointed to the survey, and he has already rendered Lieutenant Conder valuable assistance in the prosecution of the survey in spite of a severe attack of Syrian fever.

During the past season the Palestine Exploration Fund were able to avail themselves of the services of Mons. Clermont Ganneau, whose name is well known in connexion with the Moabite Stone. Mons. Ganneau has, since his return to this country, communicated an original and very suggestive paper on the origin of the native population or *fellahin* of Palestine, and the results of his mission are to be published during the course of the year.

The American survey of the country east of Jordan has been in abeyance for some months, and with the exception of a paper by Professor Paine, no notice has yet been published of the results obtained by the first expedition under Lieutenant Steever, U.S. Engineers. A sum of 12,000*l.* has recently been raised, and operations are to be recommenced at an early date.

A German party under Professor Dr. Sepp is at present engaged in an exploration of some portions of Phœnicia.

Persia.—In Persia and the adjoining countries the interests of Geography have been well supported during the past year. While Captain Felix Jones, on the one side, has been working steadily at

his great map of the countries between the Persian Gulf and the Mediterranean—a work which is now approaching completion, and the publication of which will form an epoch in our knowledge of the geography of Western Asia—Major St. John, on the other, has finished, and sent to the engraver, his not less comprehensive map of the regions intervening between the Turkish frontier to the west, and Afghanistan to the east. There have been other labourers also in the same interesting field. Sir Frederick Goldsmid, who is himself a Persian traveller of a large and varied experience, has done good service to Geography in collecting the scattered notes of the journeys which were performed thirty-five years ago between Khiva, Merv, and Herat, by Taylour Thomson, James Abbott, and Richmond Shakespeare, and in embodying these notes in a lecture which he delivered before the United Service Institution early in the year, and which he further illustrated with a map presenting, for the first time, in a correct and intelligible form, an outline of the geography of the "Debatable Land" on the Perso-Afghan and Turcoman frontier. Colonel Valentine Baker again, whose journey between Asterabad and Meshed, in company with Lieutenant Gill, R.E., was duly notified in my predecessor's address of last year, has recently submitted to the public the results of his personal observations, as compared with the Russian surveys and all other available documents, in an elaborate map of the North-eastern frontier of Persia, constructed by Messrs. Stanford and Co., which exhibits the entirely new feature of a north-easterly prolongation of the Elburz mountains, with peaks ranging from 8000 to 11,000 feet, and running in an unbroken chain from Kelat-i-Nadiri, almost as high as Kizel Arvat on the 39th parallel of north latitude. But by far the most complete and trustworthy guide for the geography of the Atreck river and the valleys and passes which indent this Elburz chain between the Atreck river and the Turcoman steppe, along the watershed which is claimed by Persia as her northern border, is to be found in the exhaustive report which has just been sent home of Captain Napier's journey through the hills from Meshed to the Caspian, a document of extreme importance, and which I hope to obtain permission to publish in the next volume of our Journal. Captain Napier's report, I may notice, furnishes additional evidence that the Oxus river originally flowed easterly along the 39th parallel (approximately), from the neighbourhood of the modern Chargúí to the point where Arthur Conolly discovered and examined the old bed between Meshed-i-Miriam and Kizil Arvat; the

great river thus cutting off and absorbing in its course the Marghus and Ochus of antiquity, now represented by the Murgháb and the Tejend, both of which are lost in the desert.

A further accession to our knowledge of the geography of Persia, especially in regard to the almost inaccessible mountain chains of the interior, is to be expected from the mission of Dr. Andreas, a young Orientalist of great promise, who has been sent out by the Berlin Government to investigate the antiquities of the country generally, and who, having abundant time and means at his disposal, as well as the requisite knowledge for conducting researches, is prepared to visit every nook and corner through the length and breadth of the land in search of sculptures and inscriptions which may have escaped the notice of former travellers.

Great Trigonometrical Survey of India.—This Survey has, under Colonel J. T. Walker, R.E., F.R.S., &c., been even more than ordinarily busy during the last year, and the record of its work, which he has drawn up, embraces a very large number of interesting and useful operations for geodetical, geographical, and general purposes.

The Trigonometrical Survey has always been essentially a pioneer and guide to all the military, civil, and survey operations of the Indian empire. During the last year it has preserved the same character, its almost ubiquitous activity invading the desert in the west, the Oxus and Eastern Turkistan in the far north, and Great Tibet and Assam in the extreme east; while at the same time it has sought to pass still farther south by crossing the Straits of Manar between Cape Comorin and Ceylon on the one hand, and by advancing from British Burmah on the other, so as to pass down the whole of the Malayan Peninsula as far as our flourishing emporium at Singapore.

During the last year the great triangulation has been extended over 7190 square miles, with 8862 square miles of minor triangulation for topographical and other purposes, while over a further area of about 12,000 square miles exterior to the above a number of peaks and points have been fixed, thus making a grand total area of 28,052 square miles, over which a great number of points have been accurately fixed, and which are now available for general survey and geographical purposes, maps, &c. Already many of those fixed in the ranges to the north of the Assam Valley (which are inhabited by independent tribes), have been

found very serviceable both in the military and in the geographical operations which were carried on in connection with the expedition against the Duffla tribe; other points to the south of Assam have no doubt also proved useful to the Nágá Expedition, which has since been carried out.

In addition to the triangulation, topographical surveys for maps were made of an area of 3653 square miles on various scales in the Himalayas and in the Bombay Presidency, and extensive geographical explorations were made in Eastern Turkistan or Kashgaria, on the Pamir Steppes, and also in great Tibet and Nepaul.

An important feature in the triangulation has been the resumption of operations in Burmah, which will afford a basis for the Topographical and Revenue Survey operations in that country, and which will connect Rangoon and Prome with the triangulation of India, and thereby remove the doubt which has hitherto existed as to the longitude of those important places. Eventually the triangulation will be carried down the whole of the Malayan Peninsula.

The completion of the revision of the southern section of the Great Indian Arc is another important feature; thus putting the whole of that great chain of triangles (which now extends from Cape Comorin to the Himalayan Mountains) on a par with, if not, as is probable, on a superior footing to, that of any other triangulation in the world.

The pendulum observations which were so unfortunately interrupted by the death of Captain Basevi have been completed, and the final results are now being computed for publication.

Assistance was rendered in connection with the observations for the Transit of Venus, which was independently observed by Mr. Hennessey of the Trigonometrical Survey with very successful results.

Another most interesting operation has been in progress, viz., that for observing the tidal constituents at certain points in the Gulf of Kutch (North of Bombay), so as to determine whether the supposed variations in the relative levels of the land and sea are now actually taking place or not. In some cases the variation has been stated to be very considerable, points formerly near the sea being now a long way from it, and in other cases the sea having encroached upon the land; while all this variation is supposed to have happened within very recent times.

Some progress has also been made with the spirit-levelling

operations; the work carried out in the present year having more especially in view the connection of the various lines of levels in Madras on canals, railroads, &c., so as to reduce them to one common datum, and thereby to make them available for general purposes, and for new projects; which has hitherto been impossible, owing to each line having started with a different origin.

The triangulation of the southern section of the Great Arc was carried on under Major Branfill. He encountered very great difficulties, and it was only by using very long sides that he was able to advance across the dense jungle-clad mountains of Southern India, which had baffled Colonel Lambton at the beginning of this century. One of the stations for junction with the Cape Comorin Base Line (which was measured in 1868–69) was found to have been carried away by the movement of the sandhills on which it was built, though its foundations had been placed ten feet below the surface.

By his skilful arrangements and energy, Major Branfill succeeded in connecting his work with the Cape Comorin Base Line, thus completing the Great Arc down to latitude 8°. The general out-turn of work was excellent; and, in addition to the stations of the great triangulation, a number of high and important hill-peaks were fixed in the almost unknown portions of the southern end of the Western Ghats.

The error of the triangulation on closing at the measured base near Cape Comorin was found to be barely appreciable, though the computed value was brought down all the way from Calcutta, viâ Madras and Bangalore, a distance of about 1400 miles. The error indeed amounted to no more than a quarter of an inch in $1\frac{7}{10}$ mile, a most satisfactory result, on which Colonel Walker may be justly congratulated, since it shows with what wonderful accuracy modern instruments and the scientific methods adopted on the Indian survey enable geodetic operations to be carried out. The error generated at the end of 1400 miles was thus found to be only two and a quarter millionths of the length measured.

A plan for connecting the great triangulation of India with that of Ceylon has been also matured in communication with Colonel Fyers, R.E., the Surveyor-General of Ceylon. Carrying the triangulation across the Straits of Manaar is of course the great difficulty in completing the connection, owing to the configuration of the coasts and islands.

The triangulation in Assam has at the same time proceeded

satisfactorily under Mr. W. G. Beverley, having been advanced through the forest-clad plains on the south bank of the Brahmaputra River to within a few miles of the civil station of Sibsāgar, which has brought the triangulation within 80 miles of Sudya, the most easterly station of Assam. Great difficulties were experienced owing to the heavy jungle-trees and gigantic grass, and also in a great measure owing to the paucity of population, labourers for all purposes requiring to be generally imported from a distance, together with their food and materials for the construction of stations. In order to avoid the great difficulties arising from having to cut paths through the jungle and grass, Colonel Walker devised a very ingenious modification in the construction of the stations of observation, utilising the wood which is so abundant in Assam by making lofty tripod-stands for the theodolites with an isolated platform for the observer, by means of which he was able to see over the high jungle and grass, the stalks of the latter being 12 to 15 feet in height, and more than 3 inches in diameter, requiring to be cut stalk by stalk, as if they were saplings. Mr. Beverley reports that these stands, from the rapidity with which they can be constructed, have helped materially to advance the Survey. Next season a further improvement is contemplated by an arrangement for raising the signals to a considerable height above these stands, by which no doubt the mutual visibility of the stations will be greatly facilitated.

Mr. Beverley fixed the points in the Duffla Hills to the north of Assam, and also in the Nágá Hills to the south-east, both of which operations, as already stated, have proved to be exceedingly useful. Altogether, considering the obstacles, great progress was made.

The Brahmaputra series of triangles, which has been in progress latterly under Captain Carter, R.E., has been brought to a successful termination by that officer. This series, on the meridian of 90°, runs mostly along the last southern bend of the Brahmaputra River between the point where it leaves Assam and the point where it is joined by the Ganges. Lying for the most part in alluvial plains covered with trees and jungles, it has only been carried out by a very large amount of hard work and exposure. Lofty towers had to be erected, and the intermediate lines had to be cleared of trees and jungle, which necessarily made the progress slow.

Taking the field at an early date, Captain Carter succeeded in doing a very large amount of work during the last season, and

he had the further satisfaction of bringing the work to a close by joining on to the triangulation on the north. He also arranged so as to fix the positions of all points of importance in the vicinity of the triangulation, but owing to the want of boundary pillars, or other permanent marks in that part of Bengal, he had to content himself with fixing the temples, and also those remarkable banyan-trees under which the villagers hold their markets. These determinations may be hereafter utilised when the Government of Lower Bengal succeeds in erecting permanent pillars at the points of junction of three or more villages, as is the good custom in Bombay, the North-West Provinces, in the Punjab, and other parts of India, to the manifest benefit of the population, since boundary disputes are thereby reduced to a minimum, and there is always something fixed to start with if any such dispute arises. Under the numerous difficulties noted above, as well as of those arising from a tropical climate and an atmosphere pervaded for months with smoke and haze, it is highly creditable to Captain Carter that he brought the work to a successful conclusion in such a short time.

Another chain of triangles has been in progress in the West, viz., the Jodhpur series, under Captain J. Hill, R.E., which is to be carried across the Bikaneer Desert, in order to join into a side of the Sutlej series. The operations of the year lay in the districts of Marwar and Jesalmīr, through the desert tract which has been called "the Region of Death." Happily the Survey party found, during their sojourn in it, that the tract was not deserving of so grim an epithet when proper precautions were taken to provide food and wholesome water—objects which the party secured by a judicious use of camels, which fortunately abound throughout the country. This region is, however, much dreaded by the people of the more favoured districts near it on account of its desolate appearance, the frequency of famines, combined with the distress and disease that are generally prevalent among the poorest classes of its inhabitants, owing to the miserable food and unwholesome water on which they are compelled to subsist. The desert in the tract between the Sutlej and the Aravulli Mountains, comprising the Bikaneer and neighbouring deserts, has always been a curious geographical feature of Upper India; and though it has been partially explored earlier in this century, and more recently has been traversed both in its eastern and southern margins by the great triangulation, there are still many interesting points with reference to its physical features which it is hoped the series now under notice will go a long way

towards solving. One of the most important, viz., as to how the drainage of that great tract was formerly effected, will no doubt be elucidated from the heights of the various trigonometrical stations as determined by the operations; and we may possibly learn a good deal as to the old course of the Saraswati and the Gagur rivers, which are now lost in the sands of the desert, as well as of the other larger rivers, which are supposed to have also flowed through portions of the desert.* Some further information will no doubt be gained as to the desert proper, and as to whether it is increasing or diminishing.

As far as the triangulation has gone, the desert was found to be covered with sandhills, which are generally flat-topped and low, and of about equal altitude, whereby the triangulator lost the advantage of a hilly country; though, on the other hand, he gained not a little from the absence of vegetation, and thereby escaped the tedious necessity of cutting lines through the jungles, as is necessary in Assam, &c. Occasionally observations were delayed when the atmosphere was pervaded with dust and sand, though not to any great extent. Arrangements are being made to extend the triangulation by longitudinal chains of minor triangles to be carried across to the Indus, so that all parts of the desert will be touched upon. and our knowledge of this extraordinary tract will, it is hoped, be as complete as can be expected, considering its physical nature and sparse population. The out-turn of work in this tract by Captain Hill and his assistants was highly creditable.

The Trigonometrical Survey Report next carries us from this extreme Western District, in longitude 72°, to the extreme Eastern ground of the Survey, viz., that of Burmah, to the east of longitude 96°; here the Eastern frontier series of triangles, which in former years was carried through the Kossiah and Tipperah Hills and down the east coast of the Bay of Bengal, skirting the Loshai Mountains, passing through the districts of Chittagong, Akyab, and Arracan, and stopping just short of Pegu and Rangoon,—has been resumed, and is now being energetically advanced by Mr. Rossenrode.

Starting with a new set of elephants, the only carriage available

* A curious and important Paper has recently been published in India upon this subject, under the title of 'The Lost River of the Indian Desert,' in which good grounds are shown for believing that the Sutlej formerly left its present bed near Ludiánah and flowed through the desert to the Indus at Arore, absorbing in its course the Saraswati, Gagur, and other minor streams, and spreading fertility through the rich and holy district of Kurukshetra.

in Burmah, the party had not a little preliminary difficulty in training these animals.

Some idea of the vigour of vegetation in Burmah may be gained from the fact that, during the four years which had elapsed since the operations were abandoned, the roads to the forward stations, which at that time had been cut so as to be perfectly clear, were so completely overgrown by jungle again that a stranger might have thought no clearance had ever been made.

As usual in the winter, in densely forest-clad countries, the atmosphere was obscured by thick haze and smoke, owing to the annual burning of the jungles. Hills even, which were only five miles distant, were obscured for weeks at a time; the observers having thus to remain at one station for nearly two months, watching in vain by night and day for glimpses of signals which, though luminous—*i.e.*, either heliotropes or lamps—were never visible until a shower of rain cleared the atmosphere.

Arrangements have been also made for determining the positions of Rangoon and Pegu; the longitude of the former being more especially a matter of importance, as it now is the port for a very large amount of shipping.

The topographical surveys in Guzerat and Kattiwar, under Major Haig, R.E., and Captain Pullan, have made good progress.

Colonel Walker, who has from the very commencement of the new topographical operations in Guzerat attempted to combine the work with that of the very detailed survey of the Revenue surveyors which had been previously made, is at last able to report that his endeavours have met with the success they deserved. He has, in conjunction with Major Haig, R.E., devised a practicable plan for utilising all that was done before, though unfortunately the previous work, in a utilitarian spirit, had been confined to the Revenue-paying portions of the country only, and the separate pieces had not been so connected together as to form a map available for reference.

The system adopted is a most ingenious one, and meets all the difficulties of the case. Major Haig is, fortunately, well supported, and it is gratifying to see that one of the latest added officers to the Great Trigonometrical Survey, viz., Lieutenant Gibbs, R.E., already shows that he has taken up his work in the same spirit as his seniors; his report on a portion of the deadly Dāng forests being more especially interesting, as it refers to an almost unknown portion of the Ghats which is inhabited by a wild race still

using bows and arrows, and who, spite of the temperature, which for most months of the year is over 100° in the shade, drink strong liquor from morning to night.

The next subject reported on is the survey of the various Himalayan Provinces; and in order to appreciate the magnitude and importance of this gigantic undertaking and its present position, it will be as well to quote Colonel Walker's own words, which are as follows, viz.: "The Himalayan Mountain Ranges may, for geographical purposes, be broadly divided into two portions, one lying to the east, the other to the west of meridian 81°. The eastern portion includes the Nepaulese territories, Sikkim, Bhootān, and the ranges to the north of the Assam Valley, which are occupied by independent hill-tribes; in this (eastern) portion most of the prominent peaks have long since been fixed by the operations of this Survey, but only a very small area has been regularly surveyed, and under existing political conditions any considerable extension of survey operations is impossible. The western portion, on the other hand, has long been freely accessible to Europeans, and regular surveys of the entire area included between the plains of Hindostan on the south, the frontiers of Eastern Turkistan and China on the north, and the tracts occupied by independent hill-tribes in the Valley of the Indus, on the west, have now been all but completed. These surveys have been executed on various scales, and at various times, by members of the Trigonometrical Survey.

"First the districts of Kangra, Lahaul, and Spiti, and the native States of Chumba, Tiri, Gurhwāl, &c., which embraced an area of 26,700 square miles, were surveyed during the years 1849–54, under the direction of Sir Andrew Waugh, in order to produce maps in the ¼-inch scale. . . . .
Then the survey of the territories of the Maha Raja of Kashmir was commenced, and an area of about 21,800 square miles was completed in Kashmir and Jammū on the ½-inch scale, but with much more topographical detail than had been given in the preceding survey; and after this the operations were extended over the remainder of the Maha Rajah's territories, but on the smaller scale of ¼-inch to the mile, which was adopted for an area of about 52,000 square miles, comprising the whole of Ladak, Little Tibet, and the regions up to the Northern boundary line, and a portion of Chinese Tibet beyond. These operations were carried on during 1854–64, and were initiated by Sir Andrew Waugh and carried out by Major Montgomerie.

"Lastly, a survey of the British districts of Kumaon and Gurhwāl was commenced in 1865 on the scale of 1 inch = 1 mile, and it is now nearly completed; the Western frontiers of Nepaul have been reached and surveyed to the farthest points visible from our own side of the frontier; the area completed amounts to 9520 square miles, and 270 outside the districts; the area remaining, amounting to 3200, is situated in the higher ranges and regions of perpetual snow which lie to the north towards the frontier of Chinese Tibet, and much of it may be surveyed on a smaller scale."

The Kumaon and Gurhwāl survey was carried out by Major Montgomerie, Captain Carter, and Lieutenant Hill.

All the Western Himalayas having in this way been provided with maps on various scales, and with a various amount of detail, the next point which has been pressing is to supply the purely British districts, which were surveyed in the earlier days on a small scale, with a modern detailed survey on a scale suitable for local requirements; a point which, by the orders of Government, could not be attended to as long as there was any portion of the mountains unprovided with at least a preliminary small-scale survey. This desideratum having now been attained, the Government has directed a large-scale survey to be made of the British districts of Jaunsār-Bāwar, Kangra, Kūlū, Spiti, &c., and operations have already been begun in Dehra Doon. We may hope to get much valuable and interesting information from these surveys, which are the first which have ever been undertaken in such lofty mountains on such a large scale.

Besides the various operations referred to above, others of a purely geodetical character have been in progress, by means of that native agency which the Trigonometrical Survey has always encouraged.

Exploration has thus been carried on in various directions by means of Asiatic explorers. A narrative and memorandum are given in the Report of an exploration of the Namcho or Tengrinoor Lake, drawn up by Lieut.-Colonel Montgomerie, R.E.; and some extracts are also furnished from the narrative, by another native explorer, of his journey through Western Nepaul from Pitoragurh, in Kumaon, viâ Jumla across the Himalayan ridge to Tadum, on the Sangpo or Upper Brahmaputra River, and then down through Nepaul along the Gundak River, and back to British territory.

Of these papers the first two, which are illustrated by a map, were prepared by Colonel Montgomerie, in England, from the original journals. They describe an exploration through an almost unknown

portion of Great Tibet from Shigatze, across the Brahmaputra River, to the northern shores of the great Namcho Lake, the farthest point of which lies about 100 miles to the north of Lhása. The above papers were briefly referred to at the last meeting of this Society. The exploration is especially remarkable as the first which has advanced to the north of the watershed of the Sangpo, or Brahmaputra, making some impression on the vast "terra incognita" of Central Tibet which lies between Lhása and the desert of Gobi. Though the explorer was at a great height above the sea, generally over 15,000 feet, he met with numerous hot springs, somewhat like the Geysers, from which the water was ejected with great noise and violence to a height of 50 to 60 feet, and in falling was frozen so as to form what looked like artificial towers. At the farthest point reached, though about 400 miles north of the base of the Himalayas in Bengal, there were no signs of any diminution of the height of the mountains, the peaks near the Tengrinoor Lake being probably more than 25,000 feet above the sea. The ordinary heights still farther north in the district of Jamiátá Dò are most probably higher than those of the Tengrinoor, as that district is said to have a severer climate, and it is impossible to say how much farther north these lofty mountains, which may be presumed to be an eastern prolongation of the Kuen-lun, extend.

The Tengrinoor is a splendid sheet of water, 50 miles in length by 25 miles in breadth, and though over 15,000 feet above the sea, it is a favourite place of pilgrimage, and boasts of several monasteries, which are permanently occupied by Lámas, in spite of the climate, which is sufficiently severe in winter to convert the surface of this lake into a sheet of thick ice.

The third paper, which is also illustrated by a map, is a very useful contribution to our knowledge of the geography of the Nepaulese territories. By it the whole course of the Gundak River has been determined, this being the third great tributary of the Ganges, whose upper course has been surveyed by these Asiatic explorers within the last few years; for the Kurnáli and the Arun-Kosi, which form the upper courses of the Gugra and Kosi, were equally unknown as that of the Gunduk before the visit of the native surveyors. The rivers which come through Bhootān and the lower portion of the Sangpo are now the only drainage lines of which we are entirely ignorant, but already Colonel Montgomerie has told us that one of his explorers is penetrating even part of this "terra incognita."

In addition to the above, most extensive and valuable geographical explorations have been made during the last year in Kashgaria and the western portions of Eastern Turkistan, in the Pamir Steppes, and in the regions of the Upper Oxus.

Captain Trotter, R.E., of the Trigonometrical Survey, was selected by Colonel Walker, R.E., to accompany the mission to Yarkund and Kashgar; he was supplied with all the requisite instruments, and accompanied by four of the trained Pundit explorers. The result has been that considerable additions to and rectifications of the geography of Eastern Turkistan have been obtained, and Colonel Walker says that Captain Trotter may well be congratulated on the success with which his labours have been crowned.

To the north of Kashgar Captain Trotter carried a survey through the Artysh Valley up to the Russian frontier near the Chadyr-kul Lake, and has connected his work with that of the Russian geographers. He subsequently made a survey of a considerable portion of the road towards Ush-Turfān to the north-east, and reached the Belowti Pass, which is 150 miles from Kashgar, and only about 90 miles from Ush-Turfān. Captain Biddulph surveyed the road from Kashgar eastwards to Marálbáshi. But no further information was gained as to the Yarkund River, nor as to the long belt of unknown country at present ruled by the Amir of Kashgar (which latter probably extends 700 miles farther east than the points reached by Captains Trotter and Biddulph), nor of the road to the west leading into Khokan viâ the Terek Pass.

Captain Trotter afterwards made a route-survey from Yangi Hissar south of Kashgar to Sirikul, and then westwards viâ Aktash over the Little Pamir by the Mirza's Pamir-kul Lake, and ascertained that the said lake is one of the sources of a river which is here called the Aksu, and afterwards the Murghābi, and which joins the Oxus near Wāmar, being probably, as conjectured, the main source of the Oxus. Captain Trotter reached Kila Punja in due course, and from thence was able to send one of his native surveyors down the Punja River for a considerable distance, viz., to Kila Wāmar in Roshān. He was unfortunately unable to go farther down the river; but an exploration has since been made up the river from the Badakhshán road viâ Kolàb to a point near Kila Wāmar by Colonel Montgomerie's havildar, so that there is now but a very small portion of this great river remaining to be explored.

From Punja Captain Trotter returned *viâ* the Great Pamir to Aktash, and thence back to Yarkund by much the same route that he had advanced by.

While Captain Trotter was absent in Wakhán, one of the native explorers was sent from Yarkund by Sanju to Khotan with instructions to penetrate as far eastwards as possible. He traversed the ancient road to China as far as the Sorghāk gold-fields, and then returning to Keria crossed the Kuen-luen Range and the great table-lands of the higher Himalayas of Chinese Tibet, reaching the village of Noh, on the Pangkong Lake, 20 miles north of Rudok, and thence returned to Leh.

Captain Trotter has prepared a geographical memoir, which contains full details of the explorations made by the party, and which is likely to prove highly interesting; and it is hoped that the Society may before very long have a full account from Captain Trotter in person of what he and his companions have seen and done. I must also here refer to the examination made by Captain Biddulph, one of Captain Trotter's companions, of the passes leading from the valley of the Oxus across the hills to Chitral, Yassin, and Gilgit, a brief account of which I communicated in my November address. In a political point of view Captain Biddulph's survey was probably the most valuable result of Sir D. Forsyth's mission, and we are accordingly very anxious to learn details.

In cartography very great progress has been made in the Trigonometrical Survey Office; a new edition of the map of Turkistan has been actually issued, and a third edition is nearly ready, which will include all the later additions and corrections. Two more sheets of Colonel Montgomerie's Trans-Frontier maps have been also published, viz., Nos. 8 and 9, besides all the usual charts and maps that are annually executed. The Report is liberally illustrated, commencing with an admirably clear chart of the Great Triangulation of India, from which its present state can be gathered almost at a glance.

The Topographical Reports are each illustrated by index charts, from which every information likely to be wanted can be gained.

The Trans-Himalayan Exploration Reports are also illustrated by maps, which thoroughly explain where and what work has been done.

And, finally, an abstract is given of the monthly meteorological results, taken from the register kept at the office of the Superintendent Great Trigonometrical Survey of India, Dehra Doon;

and when it is stated that, in addition to the above, 9207 maps and 2027 charts were issued from the office, besides 3557 diagrams and 28,125 forms, it is easy to understand how very busy the members of the Great Trigonometrical Survey of India under Colonel Walker have been during the year.

This is not the place, perhaps, to enter on any elaborate notice of the public services of the officers of the Great Trigonometrical Survey of India; but, as the President of this great Society, I trust I may be permitted to say that the Geographers of England have always regarded the Department in question as the most valuable and efficient coadjutors which they possess in extending our geographical knowledge of the East. To Colonel Walker, who, as the head of the department, has issued the exhaustive Survey Report of the present year, and to his able assistant, Lieut.-Col. Montgomerie, who has enabled me, by his careful arrangement of the materials, to include the above summary of the Report in my present Address, the thanks of this Society are especially due; and we trust they will be long spared to pursue and carry through the honourable and important labours which have already occupied so many years of their brilliant professional career.

China.—In my Anniversary Address of 1873 I alluded to the extensive journeys in the interior of China that had been performed by Baron Richthofen, and to the important additions to our knowledge of the physical geography of that great Empire made by that accomplished savant. We now learn through a recent Bulletin of the French Geographical Society that a French savant, the Abbé Armand David, has also been occupied for a series of years in making journeys of similar extent through the various provinces of China and Mongolia, and in amassing information regarding the productions, climate, and people. M. David is a member of the Lazarist Mission at Pekin, and was sent there so far back as the year 1862; but having a strong taste for the natural sciences, he devoted much of his time in making zoological collections in various parts of Northern China and in Manchuria, so that in 1865 the authorities of the Jardin des Plantes obtained from the Superior of the Lazarists permission for the Abbé to devote himself entirely to this pursuit. Under the auspices of the Museum he afterwards, in 1866, penetrated to Sartchy and Barontaba-jao, in Mongolia, and in 1868–70 ascended the Yang-tsze to beyond the Chinese frontier. The observations of various kinds made during this and other long journeys

have been published in the 'Archives du Muséum,' a publication more especially devoted to Zoology and Botany; but the geographical portions of the narrative are being extracted by M. Jules Gros, and published, as already mentioned, in the Bulletin of the French Geographical Society. A map of M. David's important journey in Mongolia, compiled by M. Hansen from data supplied by the traveller's journals, accompanies the first instalment of the work.

An interesting paper 'On the Inundations of the Yang-tsze-Kiang,' by Mr. E. L. Oxenham, of the Consular Service of China, has been communicated to us during the present Session, and will be published in our next 'Journal.' It forms a decided addition to our knowledge of the Physical Geography of China. The author, during a three years' residence at Hankow, had opportunities of observing that these wide-extending floods were of very different character as to colour of water, months of occurrence, &c.; and concluding that they could not all be attributed to the same source, he found on investigation that each kind of flood was derived from heavy rainfalls or the melting of snow near the upper part of a separate river-basin, though all the basins debouch in the valley of the Yang-tsze. Mr. Oxenham discusses the subject with much ability; and we must all hope that he will continue his observations on this and kindred subjects, now that he has returned to China to resume his diplomatic duties.

Australia.—Last year our chief topic in regard to Australian Exploration was the remarkable journey of Colonel Egerton Warburton across the interior of the western portion of the continent, for which feat we awarded him our Gold Medal. Since then we have had the gallant officer among us, and heard an account of his expedition from his own lips. At the time when news arrived in the capital of Western Australia of the long-delayed arrival of Warburton at a point within hail of the coast settlements, a still more remarkable traverse of the same desert, blank region was preparing. This was the expedition of our Associate, Mr. John Forrest, who had previously distinguished himself by the skill and success with which he had carried out numerous surveys over vast expanses of country which had defeated the efforts of many previous explorers. Mr. Forrest's expedition started from Champion Bay, on the west coast, on the 1st of April, 1874, and crossing the unexplored region at a part where it is much broader than where traversed by Warburton, reached the Peake

Station on the line of Overland Telegraph on the 30th September. The expedition was planned and suggested by Mr. Forrest himself in a letter to the Governor of Western Australia, written in July 1872; and the project then being approved, it was laid before the Legislative Council, who voted 400*l.* towards the expenses. It was not till after this that the three expeditions from South Australia (viz., those of Warburton, Gosse, and Giles) left the Telegraph Line on their march westward. As stated in his letter of instructions, the chief object of Mr. Forrest's expedition was to obtain information concerning the immense tract of country from which flow the Murchison, Gascoigne, Ashburton, De Grey, Fitzroy, and other rivers falling into the sea on the western and northern shores of the Western Australian colony, as there were reasonable grounds for believing that those rivers flowed from districts neither barren nor badly watered. The line of country to be traversed, therefore, lay far to the south of the route of Colonel Warburton. The party, consisting of Mr. Forrest and his brother (Mr. Alexander Forrest), two other Europeans, and two natives, had not the advantage of camels with which the successful South Australian Expedition had been supplied through the enterprise of its supporters, Messrs. Elder and Hughes. They took with them twenty horses, and a supply of provisions for eight months. The expectations that were formed in the colony of the discovery of fertile tracts of country beyond the head of the Murchison River were not fulfilled; but arid and desolate regions, over which the party under its skilful leader was safely led, were found stretching 600 miles from that point as far as the eastern boundary of the colony on the 129th meridian. Mr. Forrest reports of this vast area, that he thinks it will never be settled by colonists; its general character is that of a gently undulating desert, clothed with that plant of evil augury to Australian settlers, the spinifex grass. It is not, however, wholly destitute of other vegetation, being lightly wooded with acacia and other small trees, and having even some larger timber in a few of the creeks. Natives were numerous even in the worst parts of the region, and they attacked the party three times. Fifteen out of the twenty horses survived the passage of the desert, but only three of them had sufficient strength left to carry a man, and the members of the party had to walk in turns the whole way, a distance of 2000 miles. A full report of Mr. Forrest's journey has recently been presented to the Society, and will be published, together with a reduction of the magnificent map of the route, in our next year's Journal. As geographers, we cannot speak too highly

of the scientific completeness of the information supplied to us by this report and map; for not only was the entire route accurately surveyed, but copious notes were made of the geology and natural history of the country. Mr. Forrest, whom we all rejoice to see in person amongst us on the present occasion, has well earned his place in the very foremost rank of Australian explorers.

A shorter journey, made about the same time as that of Mr. Forrest into the same desert interior, deserves a few words of mention, inasmuch as it diverged into a more southerly latitude than any of those which preceded it. I allude to the expedition of Mr. John Ross, of South Australia, which was equipped by Messrs. Elder and Hughes, originally with the intention of proceeding in search of Colonel Warburton, but, on news arriving of his safety, was directed to try a south-westerly course into the unexplored area from the line of the Overland Telegraph. Mr. Ross left the Peake Station about the 20th of March, 1874, and after a few days' march, fell in with dense thickets of mulga (a kind of acacia) which appeared of boundless extent, and was quite impenetrable by camels. He reached s. lat. 30° 25′, and E. long. 131° 16′, whence he was compelled to retrace his steps to the Telegraph Line.

The persevering traveller Giles, who was equipped by public subscription in Melbourne (chiefly promoted by Baron von Müller, the celebrated botanist), and was the first to traverse a considerable extent of the western interior from the Line of Telegraph, has since made a second long journey westward. Like Forrest, he was unprovided with camels, but he succeeded in reaching the 125th meridian, at which point he was forced to return back by the death of one of his companions, who lost his way and perished in the desert. Mr. Giles' aim was to reach the watershed of the Murchison, Gascoigne, and Ashburton rivers, from the eastern slopes of which his advisers, like the West Australian authorities, vainly thought a well-watered country might be found.*

New Guinea.—In the earlier part of this Address a detailed account of the second visit of Captain Moresby to New Guinea is given, as part of the Report of Naval Survey operations of the year, furnished by the Admiralty Hydrographer. You have heard, also,

* A later telegram announces that Mr. Giles has succeeded in reaching Strangways Springs on the Telegraph Line (lat. 29° s.) from Fowler's Bay on the great Australian Bight. He had passed over "a stretch of 220 miles without obtaining a drop of water."

during the Session, a graphic description of the same visit from the lips of Captain Moresby himself; it is unnecessary, therefore, for me to repeat the incidents in this place. The discoveries of Moresby are likely to prove a turning-point in the destinies of New Guinea, for they have given rise to movements, both in this country and in Australia, in favour of extending British authority over portions of the island, which will probably not end until their aim is attained. Meantime our geographical knowledge of the country is increasing but slowly. Since Moresby's voyage we hear only of a visit made by Mr. MacFarlane, of the Missionary party mentioned in the Address of my predecessor, to Port Moresby, on the south coast, which he described as a magnificent harbour, but surrounded by a stony and barren country which would render it unavailable for settlement. Yule Island has been found more suitable for a Mission station than Port Moresby. The Russian traveller, M. N. Mikluko-Maclay, who since his Papuan journey has been exploring the unfrequented interior of Malacca, has, I am happy to announce, written for us an account of some portion of his travels in New Guinea, which has been translated and brought home by Colonel the Hon. William Feilding. Signor D'Albertis, the Italian naturalist, has been heard of as having reached Cape York on his way to New Guinea.

North America.—The most important contribution to the geography of North America which has come to our knowledge, during the past year, is contained in Professor Hayden's Report of the United States Geological and Geographical Survey of the Territories for 1873, which was published by the Washington Government in the latter part of 1874. This exhaustive account of the year's survey operations forms an octavo volume of 700 pages of close print, copiously illustrated with views, sections, and maps; besides a number of exquisite photographs of scenery mounted separately. The Survey under Professor Hayden had been for the two previous years occupied with the mountainous country around the sources of the Missouri and Yellowstone rivers, regarding which some details were given in my Addresses of 1872 and 1873; but the operations have been since transferred to the eastern portion of the Rocky Mountain range in Colorado and New Mexico, to which the Report now before us relates. The area to be surveyed was separated into three districts, and a separate party, completely equipped, despatched to each: the result has been the accumulation

of a vast amount of new information in the various branches of science. The purely topographical part of the Report forms only about one-eighth of the volume; but the officers in charge of that Department have issued, separately, a Map of part of Colorado. The horizontal measurements of the Survey were made by a connected triangulation developed from a measured base near Denver. A large number of tables of altitudes of peaks, towns, and remarkable points in the Rocky Mountains is given in this portion of the volume.

Madagascar.—One of the most original and interesting papers read before us during the Session now drawing to a close, was that of Dr. Mullens, in January last, 'On the Central Provinces of Madagascar.' This gentleman, the Foreign Secretary of the London Missionary Society, during a brief visit of only a year to the island, contrived, by making an intelligent use of his opportunities of observation, to bring back a surprising amount of new information regarding the topography, physical geography, geology, and ethnology of this wonderful island. The relative positions of all the prominent physical features as well as of the chief towns were ascertained by him and another member of the Mission with great care and evident accuracy, and depicted on maps which did credit to Dr. Mullens' skill in cartography. We now know how limited our knowledge had previously been of the interior of Madagascar, for, with the exception of the rough map published by Grandidier, the French traveller and naturalist, about four years ago, all attempts to portray the interior geography of the island have been mere guess-work. Dr. Mullens has had opportunities of surveying large portions of the island unvisited by Grandidier, and of correcting and supplementing his information regarding many parts visited by both. Some of the main features of the island were graphically described by Dr. Mullens in the paper to which I refer, especially the successive terrace-like ascents by which the plateau-land of the interior is reached from the coast; the singular way in which the fertility of the rich plateaux is due to the natural dams of basaltic rock which keep back the drainage of the rivers, and so forth. As the paper will be published entire, with the map, in the next volume of our Journal, I need not enter here into further detail; but I will not quit the subject before mentioning that other members of the Missionary body, which Dr. Mullens so worthily represents, are now engaged on the spot in adding to our

knowledge of the geography of Madagascar, and that we may hope hereafter to receive further contributions of similar character.

South America.—The Republic of Chili has always been honourably distinguished by the attention paid by its successive Governments to the scientific requirements of the nation. In former Addresses mention has been made from time to time of the progress of the official surveys of that country, and of the excellent maps which have been issued by the Department. A further step has now been made by the commencement of an annual publication, issued by the Hydrographic Office of Santiago, the first volume of which has just reached us. This important work is occupied chiefly with the Reports and Maps of the Naval Surveyors who are occupied in exploring the almost endless fjords and channels which diversify the southern coast of Chili, from Valparaiso to the Straits of Magellan. Under the direction of the present Head of the Department, Captain Vidal Gormaz, himself an accomplished geographer, this volume is sure to furnish, from year to year, a rich store of information. The first volume, published at the commencement of the present year, contains nearly 500 large octavo pages, 360 of which are devoted to Reports of original exploration: it is illustrated by twelve well-executed maps, drawn and engraved in Chili, two of which relate to rivers and passes over the Andes, the operations of the Surveys not being confined to the coast-line, but extending also to the interior, where the country required exploration. In a region which has been so much explored by our own Naval Surveyors, and which is becoming yearly of more commercial importance, through the increased use of the sheltered channels conducting northwards out of the Straits of Magellan, these Chilian surveys cannot fail of attracting the notice of Geographers, besides proving of much practical utility.

An excellent general map of the provinces belonging to the Argentine Confederation has recently been published in Petermann's 'Mittheilungen,' under the direction and according to the materials supplied by our Associate, Major F. J. Rickard, who was long resident in those countries, and has well availed himself of the unusual opportunities he enjoyed of accumulating Geographical information. In other parts of South America we do not hear of much geographical progress. The Hydrographic Commission for the Exploration of the Peruvian Amazons had terminated its labours for the present, and Captain Tucker, the chief of the Commission, proceeded in May

last to Washington for the purpose of working out the results and preparing the maps that will, it is hoped, do justice to the importance of the subject. Mr. Keith Johnston, I may add in conclusion, has just returned from his scientific mission to Paraguay, during which he has made two journeys of exploration on his own account, the results of which, it is hoped, he will communicate to this Society.

Africa.—The continent of Africa still continues to attract a large share of the attention of the public, presenting as it does an inexhaustible field for geographical enquiry, and being also closely connected with those large questions of civilization and progress which powerfully appeal to the sympathies of thoughtful men, and thus excite universal interest. The appearance of 'Livingstone's Last Journals,' which in my Address of November last I announced to be on the eve of publication, has since created a profound impression. On one side it has aroused the friends of humanity to fresh exertions for the suppression of the slave trade, and has thus led them to assist or set on foot various exploratory expeditions into the interior of Africa, which I shall notice presently. On the other side, geographers have acknowledged with gratitude the large accessions to their knowledge supplied by the Map which the Rev. Horace Waller, Livingstone's indefatigable and conscientious Editor, has compiled from the great traveller's journals and note-books. The route from the sea-coast to Lake Nyassa, laid down in the first instance from rough entries in the 'Journal,' has been since verified by the recovery of a Map, in Livingstone's handwriting, which was found by Cameron at Ujiji. The contour of the southern portion of the lake is also a good deal altered from what was previously known; while if we compare the great valley of the Lualaba from the mountains to the Equator, as conjecturally sketched in former years by Keith Johnston, Ravenstein, and Stanley, with the elaborate Map now copied from Livingstone's drawings, and partially corrected by his observations, we shall become sensible of the great improvement already acquired in our knowledge of this part of Africa. At the same time, with characteristic and most commendable caution, Livingstone left special instructions that no positions gathered from his observations of latitude and longitude should be considered to be determinately fixed until his friend Sir Thomas Maclear, Astronomer at the Cape, had duly examined them; and it is thus possible that when Sir Thomas's Report shall be

received, some alterations may still require to be made in future editions of the Map.

In connection with Livingstone's journeys along the Lualaba, which, although not, as he believed, relating to the Nile, will still always remain one of the proudest memorials of African discovery, the proceedings of Lieutenant Cameron are of the greatest interest and importance. It may be remembered that at the last Anniversary Meeting Lieutenant Cameron was reported to be at Ujiji, whither he had proceeded in order to rescue the remainder of the Livingstone papers; and that our late President, Sir Bartle Frere, relying on his friend's determined character, predicted that, if he preserved his health, he would still achieve distinction in the exploration of the lake regions. This prediction has been since amply verified; Lieutenant Cameron having not only made a full examination of the southern shores of Lake Tanganyika, and having sent home a Map of the lake, which has been published in our 'Proceedings,' and is one of the most complete bits of African Survey upon record, but having also discovered a river on the western shore, which he believes to be the long-sought outlet of the lake, and along which he has accordingly determined to travel in the hopes of tracing its source to the Lualaba, and being thus able to descend by that stream, presumed to be the same as the Congo, to the western sea-coast of Africa. Lieutenant Cameron left Ujiji on his perilous errand about this time last year, and nothing has been since heard of him, though, according to the distances reported by the natives, he did not expect to consume more than six months on his journey. It was his intention to follow Livingstone's track through Manyema as far as Nyangwé, in 4° 5′ s. latitude, and from that point to push boldly on into an unknown region, verifying, in the first place, the native reports of a vast equatorial lake, and determining afterwards whether the Congo or the Ogowé, or both of these rivers, drained off the waters of the lake to the sea. There is no concealing the fact that this projected journey of Lieutenant Cameron's, on which he has entered with little preparation, impelled by an ardent desire for geographical discovery, is one of extreme danger. If he should indeed succeed, single-handed as he is, in crossing the African continent from the forests of Manyema to the mouth of the Congo, through a country unknown and beset with wild and hostile tribes, he will have achieved a feat unparalleled in the annals of geographical discovery, and will take his place in the very first rank of African explorers. In the mean time the Royal Geogra-

phical Society has opened a subscription, with a view of providing the necessary funds for his adventurous journey, and has headed the list with a donation of 500*l*.

While discussing the Congo, it may be convenient to state that Lieutenant Grandy, whose return to England was announced in my November Address, has since submitted to the Society a full Report on the Livingstone Congo Expedition, which has been duly published in our 'Proceedings.' Lieutenant Grandy's experience is not favourable to renewed exploration in this quarter. He found the native tribes of the interior intensely jealous on the subject of European exploration, believing that the object of all so-called travellers was, firstly, to appropriate the mineral resources of the country, and, secondly, to transfer to their own hands the carrying-trade between the Upper country and the sea-coast; and he thus augured unfavourably for the success, in penetrating the interior, of the German Expedition, which has hitherto been usefully employed in minor investigations between the Congo and the Ogowé. The latter river, falling into the sea a little south of the Gaboon, was first rendered familiar by the travels of Du Chaillu, who, however, saw only its lower course. It has since been traced a long distance in the interior, first by our Associate, Mr. R. B. N. Walker, in 1866, and afterwards, in 1874, by a French party under the Marquis de Compiègne, who reached a point 300 miles above its mouth. It is now about to be subjected to a still more extensive and elaborate investigation. This expedition, indeed, which has been organized by Messrs. de Brazza and Marche (one of the Marquis de Compiègne's party) on a scale of extraordinary magnitude and completeness, and which has been further assisted and supported by the French Government, is announced to leave Paris in September, with the avowed object of ascending the Ogowé, and crossing the interior of Africa to the basin of the White Nile, the preparations being on such a scale that the travellers will be able, it is said, if necessary, to overcome the opposition of the native tribes and thus prosecute their journey by force of arms across the whole breadth of the continent. We hear that Herr Lenz, the Geologist, is on his way also to the Ogowé, with the intention of striking across and joining the main body of the German Expedition, on the march which it is about to undertake from some point near the Congo, into the interior.

At a more northern point of the Western Coast of Africa a project is also on foot which, although hardly as yet sufficiently

matured to claim the attention of geographers, may possibly in the future exercise a very important influence on the moral and physical condition of the continent. The project is simply to cut a canal through a ridge of high ground near Cape Bojador, and thus allow the Atlantic to flood the great basin of the Western Sahara, changing this vast desert into an inland sea. Until it has been determined by careful measurement that the present level of the Sahara is below that of the ocean, and that the hills through which the River Belta now flows westward to the sea can be cut through or tunnelled, so as to admit the inflow of the Atlantic in an opposite direction, it is hardly worth while to consider, from a scientific point of view, the effects that would be produced by such an important change in the physical features of Northern Africa; but there can be no doubt of the great benefits that would accrue to civilization and commerce if a waterway could be thus opened for many hundred miles into the interior of the continent.

The spirit of geographical enterprise is being developed in Eastern Africa with not less activity than on the Western Coast. The indefatigable Mr. Stanley has been sent by his English and American patrons to explore the lake regions at the head of the basin of the Nile, and is believed to be now examining the country between the Victoria Nyanza and the hill-ranges to the eastward. Owing to the withdrawal of the Zanzibar Sultan's authority over Unyanyembé, and the consequent interruption of all communication between the interior and the sea-coast, nothing has been heard of Mr. Stanley since last autumn; but we may rely with confidence on his indomitable energy, and his singular aptitude for African travel, to solve the question, which still remains undecided, as to the Victoria Nyanza being a single lake or a series of independent lagoons. The Victoria Nyanza has been also visited during the past year by Colonel Long, who was despatched on a mission to M'tesa, King of Uganda, by Colonel Gordon, the able Commander of the Khedive's forces on the Upper Nile. A letter from Colonel Long on the subject of his journey has been published in our 'Proceedings;' and although his account of the geography of his route is somewhat difficult to unravel, so much, at any rate, can be made out, that he made an excursion on the Victoria Nyanza, and embarked on what he believed to be its outlet at Urondogani, and sailed down it to Foweira, near the Karuma Falls, discovering on his way a considerable lake, through which the river passes, in about 1° 30′ N. A map of Colonel Long's route, drawn

up from his notes in the "Bureau de l'Etat Major," at Cairo, has been recently presented to the Society through Sir Bartle Frere. It appears that the new lake has been named after Ibrahim Pacha.

Colonel Gordon's own operations have been hitherto greatly impeded by the sickness of his subordinates, as well as by the difficulty of procuring means of transport. He was joined at Gondokoro by the young engineer officers, Lieutenant Watson and Chippendale in last November, and at once began to make preparations for navigating the Albert Nyanza, but, as far as we know, up to the present date, no great progress has been made in attaining that object. A preliminary survey has, it is true, been accomplished by Mr. Kemp of 130 miles of the Nile from Regiaf, south of Gondokoro, to Duflé, the river during the whole of this interval being so broken up by rapids and cataracts as to be entirely unnavigable, and arrangements have been made for transporting by hand from Gondokoro the sections of a steel boat to be put together at this upper station, from whence the passage to the lake is believed to be perfectly open; but in order to move the boilers and machinery of the steamer, far more effective means of transport are required,* and there is no immediate prospect of such means being procurable. In the mean time Lieutenant Watson has been obliged to return to England invalided, bringing with him, however, a detailed and very excellent Survey of the Nile from Khartoum to Gondokoro, and Lieutenant Chippendale is therefore left to pursue his engineering labours single-handed.†

* I am happy to be able to announce that, since this was written, the Government of India has decided to present the Khedive with six well-trained and fully-equipped elephants, to be used with Colonel Gordon's Expedition, in acknowledgment of the many services rendered by his Highness to the British Government. The elephants will be landed at Suakim, whence they will proceed to Khartoum, and so on to Gondokoro.

† Lieutenant Watson, since his arrival in England, has furnished us with the following abstract of Colonel Gordon's recent proceedings, which will be perused with interest:—

"As the Geographical Society has already been informed, Lieutenants Watson and Chippendale, R.E., and M. Linant reached Riga at the end of last November; the two former with orders to proceed to the Albert Nyanza, and the latter to Fatiko, so soon as a sufficient number of porters could be obtained. None, however, could be procured until the middle of January, when M. Linant succeeded in obtaining the services of some Bari men, and started for Fatiko, intending afterwards to go on to Foweira, a Government station on the Victoria Nile, and to follow the course of that river to Uganda, on the Victoria Nyanza.

"About the same time an ivory-caravan, commanded by Mohammed Wat-el-Mek, arrived at Gondokoro from Fatiko, and, on the 28th of January, Lieutenant Chippendale, accompanied by Wat-el-Mek and about 400 bearers, started from Regiaf for Duflé, taking with him a quantity of stores and parts of the small screw steamer, which it is intended to place on the Albert Nyanza. Lieutenant Watson

Auxiliaries to Colonel Gordon are, however, preparing for work in many quarters. An Austrian subject, of the name of Marno, who has already some experience on the Upper Nile, is desirous of exploring the mountains to the west of the Albert Nyanza, and is understood to have already started in that direction from Gondokoro; while other exploring parties attached to the Khedive's forces in the Darfúr occupation have been directed by his Highness to examine the country to the south-west of that province, and application has been duly made to permit the Europeans employed upon the duty to communicate the results of their examination to this Society.

In my November Address I alluded to the successful journey of Dr. Nachtigal in the Eastern Sahara, but we had not then received any details of his explorations. The accounts, however, which have since reached us show that the Doctor is entitled to the highest rank among African travellers. He is the first European who has ever penetrated the eastern half of the Sahara in his perilous journeys to Tibesti. He has elucidated the hydrography of Lake Chad, having traced the water to an ancient bed now in the midst of the desert. He has further explored Wadai as far as the territories of the independent negroes to the south; and finally, he has crossed from Lake Chad through Darzaleh and Darfúr to the Nile basin, thus succeeding in an attempt which cost Vogel and

did not accompany him, having been ordered to return to Lardo in consequence of ill health.

"Means of transit not being readily obtainable for the heavier pieces of the steamer, Colonel Gordon ordered Lieutenant Chippendale not to wait for them; but, on reaching Duflé, to march for the Lake, and there to obtain canoes from the natives, and to return to Duflé by the river, in order to ascertain by actual observation whether it was navigable for the steamer. Lieutenant Chippendale decided to travel by the west bank, as two Madi chiefs, who had come down with Wat-el-Mek's party, said that the Roshi tribe, who live on the west side of the hill between Duflé and the Lake, were friendly and possessed large canoes. No intelligence has been received from either Lieutenant Chippendale or M. Linant since their departure from Regiaf.

"At the end of January Colonel Gordon left Lardo, the present head-quarters station, which is a few miles north of Gondokoro, and proceeded by steamer to the River Saubat, stopping at Rabat-Shambé, the Government station among the Kytch tribe. On account of the unhealthiness of the place, and the consequent mortality among the troops, Colonel Gordon ordered it to be evacuated and the garrison to march to a point about six days' journey to the westward, and there to form a new station.

"After inspecting the stations on the River Saubat, Colonel Gordon returned to Lardo, where he arrived on the 4th March. He then proceeded to Regiaf to make arrangements for bringing up the remainder of the steamer to Duflé; and on the 17th March, the date of the last letter which has been received from him, he was just about to start for the south, hoping that before very long he would get the steamer completed and ready to navigate the Lake Albert Nyanza."

Beurmann their lives. Dr. Nachtigal has been for some time past residing at a sulphur bath at Helwan, in Upper Egypt, recruiting his health and preparing a narrative of his travels, the publication of which is looked for by all geographers with intense interest.*

It is further of importance to notice the forthcoming Italian Expedition to Eastern Africa under the Marchese Antinori. The area to be examined by this Expedition is that included between Southern Abyssinia, the Victoria Nyanza, and the line of the White Nile. The party will proceed in the first instance to the Court of the King of Shoa at Ancobar; from thence they will pass through the Galla country to Bonga, being assisted in this part of their exploration by an Italian Missionary Bishop who has resided for 30 years in Southern Abyssinia, and possesses the greatest influence over the Galla tribes. In their explorations beyond Bonga they will be guided by circumstances; but they hope to be able to connect this position with the Nile above Gondokoro, and thus complete our knowledge of this portion of North-Eastern Africa. The funds required for the expedition amounting, as it is estimated, to 4000*l.*, are being raised by private subscription, and it is gratifying to find that English aid has been liberally promised. We shall naturally follow the steps of our fellow-geographers, in the perilous and almost unknown region which they are about to penetrate, with the liveliest interest, and cordially wish them success.

With not less interest shall we regard an expedition which has just left England for the shores of Lake Nyassa, *viâ* the Zambesi and the Shiré, which although not Geographical in its chief aims, cannot fail, if it succeeds in its main object, to add much to our Geographical knowledge. I allude to the missionary party under the guidance of Mr. Edward Young, the same skilful leader who so successfully conducted our Livingstone boat-search to Nyassa in 1867. The Mission had its origin in Scotland, equally supported by the Free and Reformed Presbyterian Churches, and is planned and managed by a Committee with Dr. Stewart at its head. Their object is to found a Mission Station, to be named Livingstonia, for the industrial and educational as well as religious instruction of the swarming population of that region, on Maclear Promontory, at the southern end of the Lake. We hear that no less than

* Dr. Nachtigal, since this Address was delivered, has arrived at Berlin, and been received with great enthusiasm by the German Geographical Society, at a Special Meeting on the 2nd June.

16,000*l.* have been already subscribed in Scotland towards the expenses of this great undertaking. Mr. Young, who has accepted a set of astronomical and surveying instruments from us, intends to complete the survey of the Lake by circumnavigating its northern part, and has the ready consent of the Mission Committee to communicate his report of the survey to our Society.*

Among the other African subjects which have been brought under our notice during the past year are—1. A journey by Captain Elton on the Eastern Coast south of Zanzibar, from Dar-es-Salam to Kilwa, which is of much importance for the light which it throws on the present state of the African slave trade; 2ndly. Mr. St. Vincent Erskine's account of his journey to the Court of Umzila, King of Gosa, who rules from King George's River to the Zambesi, also of particular interest in connection with the African gold-fields and the pending arbitration of our disputes with Portugal regarding the frontier in Delagoa Bay; and 3rdly. The Rev. Mr. New's description of his visit to Usambara, which, although of no particular geographical value, possesses a melancholy interest as the last production of this earnest and most efficient missionary traveller from whom so much was expected in the future exploration of Africa.

Conclusion.—And now, Gentlemen, having rapidly sketched the present state and prospects of Geography in the various quarters of the globe, as far as they are at present known to me, I venture to offer a few general remarks on the view and objects of our own Society. I am hardly prepared to accept in its entirety the pleasing doctrine of Sir Bartle Frere, that our own prosperity is a gauge of the prosperity of the nation; but I am prepared to show that, according as we labour more or less actively in our vocation, so do we contribute, in a greater or less degree, to the fulfilment of the national wants and the advancement of the national interests. In encouraging the early study of Geography, in fostering merit by

* I ought to mention here that within the past few days the silver medals designed by Mr. A. B. Wyon, which the Council ordered to be struck for presentation to all the followers of Livingstone who were with him at his death, have been despatched to the British Political Resident at Zanzibar for distribution to the men. The medals are sixty in number, and on the rim of each is engraved the name of the recipient, with the words "Faithful to the end." The obverse of the medal presents an excellent portrait of Livingstone, with the legend "David Livingstone, born 1813, died, Ilala, 1873;" and the reverse, "Presented by the Royal Geographical Society of London, 1874."

honorary reward, in assisting travellers, in supporting expeditions, we do not merely aim at the accumulation of dry details of Geographical science, but there are always practical views of sound public benefit underlying our efforts. Exploration indeed is the pioneer of progress. Travels in unknown regions lead to the introduction of civilisation, the spread of commerce, the friendly intercourse of man with man. Among recent important works, tending to improve the condition of mankind, which owe their origin more or less directly to Geographical enterprise, we may point to the establishment of telegraphic communication across the continent of Australia; to the serious efforts being now made for the suppression of the West African slave-trade, which are the direct results of Livingstone's travels in Equatorial Africa; to the extension of trade in Central Asia; the colonisation of Southern Africa; the opening out of lines of railway communication generally throughout the world. Even in the Arctic Expedition, which is about to leave our shores, the high objects of national honour and professional efficiency have been as much considered by us as the acquisition of technical geographical knowledge. And it is, I believe, owing to this conviction that we are not a dilettante Society, formed for mere amusement, nor yet a learned body occupied exclusively with abstract science, but that we strive to utilise knowledge and to combine the practical and scientific—it is owing to this conviction, I say, on the part of the public that we owe much of our popularity and much of our power. At any rate there can be no question but that we do stand very high in public favour. The crowded state of our meetings, the continued influx of new members, the deference which is shown by the Government to our recommendations and appeals, the gracious acceptance by H.R.H. the Duke of Edinburgh of the post of Honorary President, are all so many indications of public confidence and so many incentives to sustained exertion in the laborious but honourable path which lies before us.

Desiring earnestly the prosperity of the Society, and prepared to devote whatever time and abilities I can command to the furtherance of your interests, I have cheerfully accepted the responsibility which has been imposed on me by the Council, and which you have since confirmed by your vote, of continuing for another year to direct your affairs as President. Having served a noviciate of many years under Sir Roderick Murchison, and having observed the nice judgment, the sound sense, and knowledge of the world, which he brought to bear in regulating the business of the Society, I have

usually been able, whenever any difficult question arose, to steer my way successfully by considering what he would have done in similar circumstances; and I have further had the long experience and tried discretion of our Council and permanent Staff to fall back on, if my recollection of Sir Roderick's example failed me. I rely with confidence on such infallible guides in the future as in the past, and with this tribute to the memory of one who has been justly called the Father of the Royal Geographical Society, I now take my leave of you, merely asking you, in conclusion, to remember the deep obligation that we owe to the Senate of the University of London for our continued meetings in their noble Hall, and to join with me in expressing our cordial acknowledgments for the most important aid which is thus afforded us.

PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY

DURING THE SESSION 1874-75.

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I.—*The Austro-Hungarian Polar Expedition of* 1872-4.

By JULIUS PAYER.

[*Read*, November 10th, 1874.]

IT was not the object of the Austrian Expedition to search for the unknown country which the results of our preliminary expedition, undertaken in 1871, had made it likely would be found to the north of Novaya Zemlya, but to discover a north-east passage. This, its principal object, the Expedition has failed to attain, and the country referred to was discovered instead.

The limited time, as well as the dignity of a scientific meeting, require that in the following report all those events of a mere personal nature, and the adventures incidental to every Arctic Expedition, should not be dwelt upon; and this all the more, as the limited time will not even permit us to treat facts of scientific interest at as great a length as we should desire.

The *Tegethoff*, a screw-steamer of 300 tons, left Bremerhafen on the 13th of June, 1872, furnished with stores and provisions calculated to last about three years. Including Captain Carlsen, the well-known Norwegian navigator, who joined the Expedition at Tromsö in the capacity of ice-mate and harpoonier, the crew numbered twenty-four men, all told, amongst whom were sixteen Dalmatian seamen.

On the morning of the 14th of July we left Tromsö, shaping our course towards the north-east. A few days afterwards we doubled the North Cape; and on the 25th of July, when in 74° 30′ N. lat. and 48° E. long., we reached the edge of the

packed ice, the unexpectedly southern position of which we had every right to consider a bad omen.

The masses of ice against which we had to struggle at that time, as well as those which we encountered subsequently, were certainly far less formidable than those with which we had become acquainted five years before, on the coast of Greenland; but they nevertheless seriously obstructed our progress. Large floes, separated by navigable lanes of water, were rarely met with, but immense quantities of broken fragments. Early in August we were actually beset for a few days, so as not to be able to move. Subsequently, however, we regained our liberty, and in lat. 75° N. we reached the open water extending along the coast of Novaya Zemlya. The decreasing temperature and quantity of ice showed, indeed, that the summer of 1872 was the very opposite of that of the year before. Aided by steam-power, we fought our way through a second barrier of ice, and only reached open water in the latitude of William Island. When still a little south of that island, we were overtaken by the yacht *Isbjörn*, in which Count Wilczek had effected his difficult passage from Spitzbergen, in order to establish a depôt for our use near Cape Nassau.

The two vessels kept company as far as the low Barents Islands, where compact masses of ice, driven by south-westerly winds towards the coast, barred all progress for a week. Only on the 21st of August, the ice having exhibited symptoms of breaking up, we parted company, and the *Tegethoff* steamed slowly away toward the north.

But our hopes were vain! Night found us encompassed on all sides by ice, and for two long and dreary years! Cheerless, and barren of all hope the first year lay before us, and we were not any longer discoverers, but doomed to remain as helpless voyagers on a floe of drifting ice.

The unusually severe frost of the autumn of 1872 soon solidified the surrounding fragments of ice, from which neither sawing or blasting were able to effect our release. All our exertions were frustrated by its incredible elasticity, and by the rapidity with which pieces sawn asunder froze together again. Thus fettered, we drifted, at the mercy of the winds, towards the north-east.

Our position was thus sufficiently miserable, but on the 13th of October it became gloomy in the extreme. On that day the lethargy in which everything around us had so long been buried suddenly gave place to active commotion, and thenceforth we were exposed to the fearful pressure of the ice. Many a time we were summoned to be ready to save ourselves in case of the vessel foundering, and all this in the midst of a Polar night, and

without knowing whither to turn for safety. Our vessel, however, bravely withstood the pressure, though the floe upon which it was fixed had been uplifted by others which had forced their way under it, thus raising her aft, and causing her to heel over to port.

Preparations for passing the winter had by this time been made. The deck was covered with snow, an awning was spread from the mainmast forward, and a rampart of ice fixed round the ship. The latter required to be repaired frequently in consequence of the havoc caused by the motion of the ice.

Special care was taken to keep the crew employed. Watchers were set regularly, exercise was taken, and school kept. On Sundays the members of the Expedition met for a simple but impressive Divine service under the awning, when the Bible was read in Italian by the light of a train-oil lamp.

Meteorological observations were made regularly, Lieutenants Brosch, Orel, Captains Carlsen, Lusina, and Krisch relieving each other every two hours. The uncertainty of our position rendered it necessary to keep a watch constantly on deck, through which we were regularly informed of the approach of Polar bears, whose flesh formed a most important addition to our diet. Nevertheless, the sanitary condition on board during the first winter left much to be desired, so that our excellent surgeon, Dr. Kepes, was kept fully occupied. Scurvy and affections of the lungs made their appearance in spite of every precaution, the former partly on account of the congelation of the damp covering our cabin walls, and partly owing to mental depression brought on by our critical position, and which only disappeared when it became more hopeful, and the summer's work kept every one fully occupied.

Our small stock of wine was reserved for the use of the sick. The rest contented themselves with a daily allowance of artificial wine, which we prepared on board from glycerine, sugar, meat extract, tartaric acid, alcohol, and water. A small plant-case, suspended over the cabin stove, supplied us every week with a little cress and cabbage for the scorbutic. The dogs—whose number had by time been reduced to seven—were lodged on deck in boxes filled with straw. They were fed, at first, with dried horseflesh, and subsequently on the flesh of seals and bears.

On the 28th of October the sun disappeared below the horizon, not to rise again for 109 days. All the birds had left us, and during five long winter months we were obliged to burn lamps in our cabins. For weeks it was next to impossible to leave the ship. The Polar night was rarely of that indescribable clearness which has been noticed on land and by ourselves on the

coast of Greenland. Whenever a sudden change of temperature caused the expanse of ice to break up, dense vapours arose from the fissures, which not only further obscured the generally inky sky, but likewise produced that immense amount of precipitation which we experienced, especially during our second winter. A fine snow fell almost continuously, and in the course of the winter of 1873–74 it attained a depth of 12 feet. On the arrival of spring our vessel was completely buried in it, although nearly the whole of the snow which fell during the preceding winter had disappeared during the summer.

Our observations on the evaporation of the ice during the Polar night agree in the main with the results obtained by Parry on Melville Island. The winds nearly balanced each other as regards direction as well as force.

A hut of coal had been built on the ice, to serve as an asylum in case of the vessel being lost, but it was destroyed by a movement of the ice on Christmas Eve; and we considered ourselves fortunate in being permitted to open Christmas Day itself in undisturbed tranquillity, occupied with thoughts of home.

The first day of the new year brought with it no prospect of an early release. We were still drifting towards the north-east, and even imagined that we might be carried to the coast of Siberia. Fate, however, had ordained otherwise; for after we had crossed the 73rd degree of longitude, the wind shifted, and thenceforth, helpless as before, we drifted towards the north-west.

On the 16th of February the sun again made his appearance above the horizon; and on the 25th the pressure of the ice which had tormented us hitherto, having literally hemmed us in by a wall of craggy ice-mountains, ceased as suddenly as it had begun. The cold continued to be severe: the mean temperature of February was $-31°$ Fahr., and towards the close of that month it reached its highest minimum, $-51°$ Fahr. But this cold is borne easily, as the cabin affords ready means for warming oneself; and consequently several of our men only reluctantly put on their fur clothes when ordered on deck.

The Aurora in its ineffable beauty illumined the heavens during the whole of the winter, but diminished in frequency as the days grew longer. It generally appeared in the south, and only rarely was more than one corona seen on the same night. (Since the beginning of September they were the only incitation which we received from beyond.) Like mighty streams it rushed over the firmament, sometimes from west to east, at others in a contrary direction; and the corona vanished as rapidly as it appeared. It was most intense between eight and ten in the evening, and its appearance was never attended by

noise. Magnificent lights proved generally the forerunners of bad weather.

In the summer of 1873 our hopes of an early destruction of the floe, and consequent liberation, revived. The mean temperature of the past year had been 2·75° Fahr. In the course of the summer we observed a maximum temperature of 45° Fahr.; the black-bulb thermometer occasionally indicated a solar heat of 113° Fahr., and on days like these, when there was no wind, we had a sensation of stinging heat. Our hopes were based upon the evaporation of the ice, caused by the powerful effect of the sun, and upon its destruction by winds and waves, but not upon its melting in a sea the surface temperature of which never rose above freezing-point. The progressive conversion of the surface ice into sludge was witnessed by us from day to day, the cliffs and walls of ice crumbling away and evaporating, until nearly the whole of the sea was covered with a thick chaotic layer of sludge.

Thus encouraged, we made fresh efforts to regain our liberty, and the months of May, June, July, and August, were spent in futile endeavours to saw through the ice which surrounded us; but our floe, which had attained a thickness of 40 feet, in consequence of other floes forcing themselves underneath it, rendered all our attempts futile. The centre of our vessel, and the uplifted part abaft, remained immovably fixed upon the floe. The surrounding ice and snow having melted away and evaporated to the extent of 12 to 18 feet, we found ourselves fixed at a considerable elevation above the general level; and the danger of being capsized had to be provided against by supporting our masts with strong spars. I ought to state that our floe varied considerably in size from time to time; during the last winter it was shattered almost daily, but congealed again immediately. At the time now referred to (August, 1873) it was 5 to 7 miles in diameter.

The northerly winds of July drifted us to the south, as far as lat. 79°; but August saw us again drifting to the north. I ought to state distinctly that nothing justified us in the assumption that the direction in which we drifted was at any time due to oceanic currents. The winds alone caused it, and a cessation of the wind led to a cessation in the movement of the ice. It struck us as remarkable that the direction in which we drifted was always on the right hand of that in which the wind blew, and that our vessel should have veered only to the extent of one degree in azimuth during the four preceding months.

In the course of the summer of 1873, when in about 79° N. lat. and 60° E. long., we drifted over an extensive bank; our

soundings, which had hitherto varied between 100 and about 270 fathoms, becoming much less.

The temperature of the sea was measured at different depths; and the use of the dredging apparatus resulted in a small zoological collection, only a portion of which we were able to bring to Europe. Drawings of some of the specimens which we had to abandon have, however, been made.

Our hopes that the ice would break up grew less and less every day, though the familiar grating sound which proceeds from the ice giving way was heard frequently, and dark streaks on the horizon pointed to the existence of fissures in the ice. We had already resigned ourselves to the necessity of being obliged to pass a second winter as inactive and perilous as the first, when the state of affairs all of a sudden underwent a change in our favour.

We had long ago been drifted into a portion of the Arctic Sea which had not previously been visited; but in spite of a careful look-out, we had not been able hitherto to discover land. It was therefore an event of no small importance when, on the 31st of August, we were surprised by the sudden appearance of a mountainous country, about 14 miles to the north, which the mist had up to that time concealed from our view.

At that moment all our past anxieties were forgotten; impulsively we hastened towards the land, though fully aware that we should not be able to get further than the edge of our floe. For months we were doomed to suffer the torments of Tantalus. Close to us, and in fact almost within reach, was a new Polar land, rich with the promise of discoveries, and yet, drifting as we were at the mercy of the winds, and surrounded by open fissures, we were unable to get any nearer to it.

At length, towards the end of October, we approached within 3 miles of one of the islands forelying the main mass of the land. Every other consideration was now thrown to the winds, and making our way over the rugged, hummocky surface of the ice, we for the first time placed our feet upon land, in lat. 79° 54′ N. The ice covering the sea close to the shore was only one foot in thickness, and it was clear that an open lane of water had existed periodically during the preceding summer. An island more desolate than that which we had reached can hardly be imagined, for snow and ice covered its frozen and *débris*-covered slopes. But to us it was of such importance, that the name of Count Wilczek, the originator of our Expedition, was conferred upon it.

The sun had deserted us for the second time on the 22nd of October; but we availed ourselves of the few hours vouchsafed us for a week afterwards to make a few excursions to a distance

of 10 miles from the vessel, without, however, being able to enlarge our knowledge of the new country. Was it merely the southern capes of islands of small extent which we had before us, or a country of large extent? Nor were we able to determine whether the white patches which we discovered high up between the mountains' summits were glaciers or not.

The increasing darkness of the Polar night for the present rendered every attempt at exploration impossible; and we feared lest northerly winds might drift us far away from our present position before the approach of spring should enable us to commence our exploratory journeys. Nor was our position at that time at all a safe one. Southerly winds had driven us close to the land, and during the first half of October we still suffered seriously from the pressure of the ice. Our floe was shivered into fragments, and it almost appeared as if the anxious days through which we had passed were about to return. In expectation of an unfortunate issue, we took the same measures of precaution which we had taken during the preceding winter, and were ready to leave the ship at a moment's notice. Fortune, however, did not again forsake us, and we were permitted to pass the second Polar night (125 days in length) without suffering the horrors of the first. There occurred no further pressure from the ice; and our vessel, fixed to its floe, and surrounded for the first time by icebergs, remained immovable, close within the outer edge of the land-ice, and at a distance of three miles from the nearest coast.

This position enabled us to look towards the future with a certain amount of assurance; it rendered existence more endurable, and enabled Weyprecht, Brosch, and Orel to determine the magnetic elements with a great amount of accuracy. Orel, moreover, determined the astronomical position of our winter-quarters, which he found to be in lat. 79° 51′ N., and long. 58° 56′ E.

During the winter of 1873–74 much more snow fell than during the preceding one, and snow-drifts, brought on by northerly winds, continued for days. At the height of the Polar night we were scarcely able to distinguish night from day, and were enshrouded in darkness for weeks. Christmas was celebrated in a snow-house built upon our floe. In January the cold set in again exceedingly severe, and the mercury remained frozen for more than a week. The snow became as hard as pumice, and its surface granular. The petroleum froze in the glass lamps under the awning, the lamps went out, and even our cognac was changed into a solid mass.

The visits of bears were as frequent then as they had been at other seasons of the year: they came close up to the ship,

and were killed by regular volleys fired from deck. The bears here are certainly much less ferocious than those we met with in Eastern Greenland, where they not infrequently attacked us, and, on one occasion, they even carried one of the crew out of the ship: here they generally took to flight as soon as we made our appearance. As regards the disputed question whether bears pass the winter in a dormant state or not, we observed that amongst the great number shot by us during two winters, there was not a single female; and during our second sledge expedition in the spring of 1874, we even discovered a tunnel-shaped winter hole in a snow cone lying at the foot of a cliff, which was inhabited by a female bear and her cubs. On encountering bears, we found it generally most advantageous to fire after they had approached within a distance of 50 or 80 paces.

A portion of the flesh of sixty-seven ice-bears which we killed, amounting altogether to about 12,000 lbs., proved to be the most efficient remedy against the scurvy, from which several of our men were again suffering. The care of our surgeon, as well as the re-appearance of the sun on the 24th of February, saved most of our patients from protracted suffering; but owing to our stock of medicines having become very much reduced, a third winter would certainly have exhibited far more unfavourable results. This consideration, joined to the certainty that our vessel was indissolubly fixed to the floe, which in the ensuing summer would again drift about at the mercy of the winds, as well as the danger of its capsizing on the melting of the snow, led to the resolution to abandon the vessel towards the end of May, and attempt a return to Europe by means of our boats and sledges.

The interval was to be devoted to an exploration of the country by means of sledge expeditions, the fortunate termination of which must be left in no small measure to chance. For had the vessel been drifted away during the absence of the explorers they would have been exposed to certain destruction, and the crew remaining on board would have been weakened considerably. But the exploration of the country, lying as it did so invitingly before us, was considered to be worth the risk.

March had arrived, and although the cold was still severe and the weather by no means favourable, the necessity of making the best of the short space of time at our disposal induced us to start upon our first sledge expedition. On the 10th of March, the Tyrolese, Haller and Klotz, the sailors, Cattarinich, Lettis, Pospischill, and Lukinovich, three dogs, and myself, left the *Tegethoff* with our big sledge. We travelled in a north-westerly direction, along the coast of the extensive Hall Island, ascended

Capes Tegetthoff and M'Clintock, 2500 feet in height, and traversed the picturesque Nordenskjöld Fiord, the interior of which was bounded by the gigantic ice-wall of the Souklar Glacier. The land before us appeared to be utterly void of life—immense glaciers looked down upon us from between the desolate mountains, which rose in steep doleritic cones and plateaux. Every object around us was clothed in a mantle of glaring white, and the ranges of columns of the symmetrical mountain-terraces looked as if they were encrusted with sugar. In no single instance could we see the natural colour of the rock, as in Greenland, Spitzbergen, or Novaya Zemlya. This was owing to the immense precipitation and the moisture of the air, which condensed on coming into contact with the even surface of the cliffs. The unusual moisture of the air, moreover, caused us frequently to over-estimate distances, which is quite contrary to the usual Arctic experience. Perfectly clear days were exceedingly rare.

The cold during this journey was very great, and amounted on one occasion to -58° Fahr. (on board ship it was $-46{\cdot}25^{\circ}$ Fahr.). We were bound to exercise the greatest precaution: our nightly rest in the tent was disturbed, and the crossing of the Sonklar Glacier, during a slight wind, was exceedingly painful. Our clothes were as stiff as a coat of mail; and even our rum, strong as it was, appeared to have lost both potency and fluidity. We slept in fur coats; but in the daytime we found that clothes made of the skins of birds were best adapted for resisting the rigour of the climate. In spite of every precaution, however, we suffered much from frost-bites, against which a mixture of iodine and collodion proved most efficacious.

Immediately on our return to the vessel, on the 16th of March, we set about making preparations for a second sledge expedition, which was to extend over thirty days, and was to be devoted to an exploration of the land in the north. Soon afterwards one of our companions (Mr. Krisch, the engineer) succumbed to a protracted tuberculosis of the lungs, aggravated by scurvy. On the 19th we buried him in a lonely spot surrounded by columnar basalt, and erected a wooden cross upon his grave.

On the 24th of March we started for the north. Our party included Mr. Orel, the two Tyrolese, three sailors (Zaninovich, Sussich, and Lukinovich), and myself. We all wore snow-spectacles, blinkers, masks covering half the face, knitted woollen gloves, and sail-cloth boots. We were armed with doubled-barrelled Lefaucher rifles, having a calibre of 12$^{mm.}$, and firing explosive bullets and steel projectiles. In preparing our equipment we followed explicitly the advice given by Admiral

Sir Leopold M'Clintock, and the successful issue of our expedition is due largely to this circumstance.

Our team of dogs, unfortunately, was not any longer complete, and only three of them assisted us in dragging our large sledge, which carried stores and provisions weighing 16 cwts. The rest of the dogs were either dead or incapable of rendering service; but even the three remaining ones, being powerful animals, proved valuable auxiliaries.

The temperature during this journey, quite contrary to our expectations, did not fall below $-26\cdot50°$ Fahr., but snow-drifts and moisture, the opening of fissures in the ice, and the flooding of our path by the sea gave us much trouble.

The results of this journey cannot be fully appreciated without reference to maps and sketches; and, anticipating the chronological order of our report, we will at once state that the newly-discovered country equals Spitzbergen in extent, and consists of several large masses of land—Wilczek Land in the east, Zichy Land in the west—which are intersected by numerous fiords, and skirted by a large number of islands.

A wide sound—Austria Sound—separates these masses of land. It extends north from Cape Hansa to about lat. 82° N., where Rawlinson Sound forks off towards the north-east. The latter we were able to trace with the eyes as far as Cape Buda-Pest.

The tide rises about 2 feet in Austria Sound, and exercises but a small effect, merely causing the bay-ice to break near the coasts. Dolerite is the prevailing rock. Its broad, horizontal sheets, and the steep table-mountains, which recall the Ambas of Abyssinia, impart to the country its peculiar physiognomy. Its geological features coincide with those of portions of North-eastern Greenland. A tertiary carboniferous sandstone occurs in both; but only small beds of brown coal were discovered. On the other hand, amygdaloid rocks, which are so frequent in North-eastern Greenland, were not met with in Francis-Joseph Land; and whilst the rocks in the south were frequently aphanitic in their texture, and resembled true basalt, those in the north were coarse-grained, and contained nepheline.

It is an established fact that portions of North-eastern Greenland, Novaya Zemlya, and Siberia, are being slowly upheaved; and it was, therefore, very interesting to meet with raised beaches along the shores of Austria Sound, which attested that a similar upheaval was taking place here likewise.

The mountains, as a rule, attain a height of 2000 or 3000 feet, and only towards the south-west do they appear to attain an altitude of 5000 feet. The extensive depressions between the mountain-ranges are covered with glaciers of those gigantic pro-

portions only met with in the Arctic Regions. Only in a few instances were we able to determine the daily motion of the glaciers by direct measurements. On the coast they usually form mural precipices, 100 to 200 feet in height. The Dove Glacier, on Wilczek Land, is undoubtedly one of the most considerable of the Arctic Regions. The glaciers visited by us were characterised by their greenish-blue colour, the paucity of crevasses and extraordinarily coarse-grained ice, a small development of moraines, slow motion, and the considerable thickness of the annual layers. The *névé*, or glacial region above the snow-line, was much more elevated above the sea than in Greenland or Spitzbergen.

Another peculiarity which characterises all the low islands in the Austria Sound is their being covered by a glacial cap.

The vegetation is far poorer than that of Greenland, Spitzbergen, or Novaya Zemlya, and, excepting in the Antarctic Regions, no country exists on the face of the earth which is poorer in that respect. The general physiognomy of the flora (but not that of the species) resembles that met with in the Alps at an altitude of 9000 or 10,000 feet. The season during which we visited the country was certainly that in which vegetable life first puts forth its appearance, and most of the slopes were still covered with snow; but even the most favoured spots near the sea-level, which were no longer covered with snow, were unable to induce us to arrive at a different conclusion. On level spots even we scarcely met with anything but poor and solitary bunches of grass, a few species of Saxifrage, and *Silene acaulis.* Dense carpets of mosses and lichens were more abundant; but most abundant of all was a lichen—the winterly *Umbilicaria arctica.*

Drift-wood, mostly of an old date, was met with on many occasions, but only in very small quantities. We once saw lying, only a trifle higher than the water-line, the trunk of a larch, about a foot thick and some 10 feet in length. The drift-wood, like our vessel, has probably been carried to these latitudes by the winds, in all likelihood from Siberia, and not by currents.

The country, as might have been supposed, has no human inhabitants; and in its southern portion scarcely any animals, excepting ice-bears, are met with.

Many portions of the newly-discovered country are exceedingly beautiful, though it bears throughout the impress of Arctic rigidity.

This and the subsequent sledge journeys have convinced us of the difficulty which any future expedition would meet with in discovering a harbour to winter in, no locality for such a purpose having been discovered by us.

It has always been a maxim of Arctic explorers to name their discoveries in honour of the promoters of their enterprise, or of their predecessors. The countries discovered may never become of commercial importance; but the only manner in which I was able to record my gratitude towards those who had devoted their means to the success of our Expedition, consisted in connecting their names with the newly-discovered countries. The name of H.I.M. Francis-Joseph was consequently bestowed on the whole of the country discovered by us, and other names to the several parts of it.

Owing to the mists which generally hung over the ice, we should not have been able to trace the northerly direction of the Austria Sound had we not frequently ascended high mountains. The ascents of Capes Koldewey (80° 15′), Frankfurt (80° 20′), Ritter (80° 45′), Kane (81° 10′), and Fligely (82° 5′), moreover enabled us to survey the surrounding country, and to select the more suitable tracts to follow.

An uninterrupted expanse of ice, with numerous icebergs scattered over its surface, extended from coast to coast. It was evidently of recent formation, and numerous fissures and barriers, formed of hummocks, crossed it in many places, and constituted serious obstacles to our progress, which we were able to surmount only at a vast expenditure of time and labour. Our track then led over this expanse of ice; and starting from Cape Frankfurt, at the portal of Austria Sound, it led us through regions, with respect to which we had learnt nothing during our first sledge journey.

Omitting for the present all details concerning our journey, it may suffice to state that we crossed the 80th degree of latitude on the 26th of March, reached the 81st degree of latitude on the 3rd of April, and observed five days afterwards the latitude of 81° 37′. We imagined at that time that we had approached nearer to the Pole on land than had ever been done before, for we were not then aware that the American Expedition, under Hall, had reached 82° 9′ on land, and 82° 26′ by sea, the year before.

To the south-east of Crown Prince Rudolf Land we turned into the vast Rawlinson Sound, which promised to lead us almost straight to the north; but we soon got entangled in a chaotic mass of ice, which, owing to its height, prevented us from seeing the land, through which it required our utmost exertions to force our way. The small horizontal intensity of the needle, moreover—which is but natural in a high latitude—repeatedly made us lose our way; and finding that the hillocks of ice became more formidable in proportion as we advanced, we changed our course, and returned to Austria Sound. We

frequently encountered ice-bears while in Rawlinson Sound. They came towards us whenever they caught sight of us, and fell an easy prey to our rifles.

The decrease of our provisions and want of time made forced marches necessary, and necessitated a separation of our party. The large sledge, with Haller and four others, was left behind in lat. 81° 38′, under a cliff of Hohenlohe Island, whilst Orel, Zaninovich, and myself, with the dog-sledge and half the tent, continued the journey. The sledge was now drawn by two dogs only; the third, a Lapland reindeer-dog, having some time previously perished in a snow-storm. Haller was ordered to wait a fortnight for our return, and then to make the best of his way back to the vessel.

Our first aim was to cross Crown Prince Rudolf Land in a northerly direction. This necessitated our crossing the extensive Middendorf Glacier, which past experience and the great cold justified us in believing to be possible, and we at once set about it. After a laborious journey along the terminal cliff of the glacier, we at length succeeded in gaining its surface, but had scarcely proceeded a hundred paces when an immense crevice swallowed up Zaninovich, the dogs, and the heavily-laden sledge. Mr. Orel, fortunately, had remained some distance behind; and I escaped a similar fate by cutting through my harness. Not being able by myself to extricate those engulfed, I ran back to Hohenlohe Island, 12 miles distant, whence I quickly returned with the rest of our party. By means of long ropes we succeeded at length in raising men, dogs, and sledge, to the surface, and were fortunate in being able to continue our journey on the following day without having sustained serious injury. The men returned to the depôt; our small party, having abandoned the treacherous surface of the glacier, gained the western coast of the island by a circuitous path, along which we travelled to the north.

Here we were destined to witness a most striking change in the aspect of nature. A water-sky of a dusky colour made its appearance in the north, foul yellow vapours collected below the sun, the temperature rose, the ground under our feet became soft, and the snow-drifts broke under us with a rumbling noise. We had previously noticed the flight of birds from the north, here we found the rocks covered with thousands of auks and divers. They rose before us in immense swarms, and filled the air with the noise of their vehement whirring, for breeding time had arrived. Traces of bears, hares, and foxes, were met with everywhere, and seals reposed sluggishly upon the ice. We were justified, therefore, in believing that open water was near at hand, but personal observations which we were able to make

on the following day, after we had ascended the hills, and the results of which I embodied in a sketch, showed that even our not very sanguine expectations as regarded the extent of open water were not realized.

Our track henceforth was far from safe. We were no longer travelling over old ice, but now a crust of young ice, hardly one or two inches thick, covered with *salt*, very flexible, and crossed by veritable walls, built up of fragments, resulting from recent fractures of the ice. We tied ourselves to the rope, carried our things separately, opened a path with the axe, and continually examined the thickness of the crust which bore us.

We rounded Auk Cape, which resembled a gigantic aviary, and reached the two lonely rocky towers of the Cape of Columns. Here we first found open water extending along the coast.

This distant world was sublime in its beauty. From a height we looked down upon the dark sheet of open water, dotted with icebergs like so many pearls. Heavy clouds hung in the sky, through which penetrated glowing rays of the sun, causing the water to sparkle, and above was reflected the image of another sun, but of a paler hue.

At an apparently immense height the ice-mountains of Crown-Prince Rudolf Land, bathed in a roseate hue, stood out clearly visible through the rolling mists.

The 12th of April was the last day of our advance to the north, and, although not perfectly bright, it was more so than most of its predecessors. The thermometer stood at 54° 50′ Fahr.

From the Cape of Columns, owing to the open water referred to, it was no longer practicable to travel over the ice, and we were compelled to take to the hills.

On starting we buried our baggage in the crevasse of a glacier, in which we had slept, and where it was safe from prowling ice-bears; and with the dog-sledge we travelled over a snow-field towards the hills, which were 1000 to 3000 feet in height. On reaching the prominent rocky Cape Germania we observed the meridional altitude (81° 57′ N.). Here we left the sledge, and, tied to the rope, crossed the *névé* of a glacier, which descended in gigantic steps towards our left. But the many crevasses which obstructed our path, and into which we broke frequently, as well as the certainty of having reached 82° 5′ N., after a march of five hours since noon, induced us to abandon further discovery, and having pushed to the north for seventeen days, we halted on the height of Cape Fligely.

We were now in a position to judge of the extent of coast

water. It turned out to be a "Polynia," bounded by old ice, within which floated ice-masses of recent formation, not very close. As I am anxious on this occasion to confine myself to a record of fact, I abstain from entering upon a discussion concerning the navigableness and nature of those portions of the Arctic Ocean which have not hitherto been seen by anyone.

There cannot, however, be any doubt that the facts observed, and the sight upon which we looked from Cape Fligely, spoke as little in favour of the theory of those who believe in the existence of an open Polar Sea as of those who maintain that the Polar Basin is covered with ice throughout the year. The truth will probably be found to lie between these two extremes. The hope of finding a navigable sea in latitudes not hitherto attained is not yet extinct, and is most likely to be realised by hugging the coast, but depends in a large measure upon a favourable year.

The success of an expedition sent out to attain the highest possible latitude depends, moreover, largely upon the routes selected. The plan of penetrating through Smith Sound, which has been advocated in this country, appears to offer most advantages in these respects. Any theoretical reasons adduced in favour of this route are seconded most powerfully by the fact that a very high latitude has been reached here on repeated occasions. If an expedition should succeed in reaching a winter harbour in a latitude as high as that reached by the last American Expedition, it would then be in a position, by means of extensive sledge journeys along the coast, to reach a latitude in the course of spring, the attainment of which would be attended by far greater difficulties along any other routes.

Our own track to the north of Novaya Zemlya carries no weight in considering this question, for we were indebted for our progress to a floe of ice, and not to our own exertions. The difficulties which any succeeding navigator would have to contend with on this route may be estimated from the fact, that on our return we found the sea encumbered with ice to such an extent that even boat-navigation was hardly possible, and we were obliged to haul up our boats many hundred times and drag them over the ice. We, certainly, should not have been able to return in our vessel, although the summer of 1874 was exceptionably favourable. But if an expedition be fitted out, not with a view of reaching the highest possible latitude, but to study the nature of Arctic countries, then the interior of Greenland would certainly appear to be deserving of the first consideration. But our neighbourhood was at that time of more immediate interest to us than the question of the navigableness of a remote portion of the Arctic Ocean. We had before us

extensive lands covered with mountains, and bounding a wide sound stretching towards the north-east, which we were able to trace as far as lat. 83° N., where the imposing Cape Wien (Vienna) forms the western extremity of a country upon which I conferred the name of Petermann, to whom geographical science, and particularly Arctic explorers, are so largely indebted.

Crown-Prince Rudolf Land extended towards the north-east, its furthest visible point being a cloud-wrapt rocky promontory in lat. 82° 20′ N., named in honour of Admiral Sherard Osborn. Two other localities, visited by us, but not on this occasion, were named after two other renowned English navigators, namely, Admirals Collinson and Back.

We do not desire to start any fresh theory with reference to the distribution of land around the Pole; but the coast as well as the gigantic glaciers certainly gave us the impression of having entered a group of islands of considerable extent, thus partly confirming Petermann's theory of an Arctic archipelago.

The innumerable icebergs met with in all the fiords of Francis-Joseph Land formed a remarkable feature, for to the south of it—that is, in the Novaya Zemlya Sea—scarcely any were met with. We are not in a position to ascribe the presence of these icebergs to ocean-currents, though their absence in the Novaya Zemlya Sea would appear to point to their finding an outlet towards the north.

Having planted the Austro-Hungarian banner upon the farthest point reached by us, and deposited a document, testifying our presence, in a cleft of the rocks, we turned back towards our vessel, which lay some 160 miles to the south.

Having rejoined our comrades, who anxiously waited for our return at Hohenlohe Island, forced marches, and a deliverance from all impedimenta excepting the tent and provisions, soon brought us to lower latitudes. But after we had crossed the glaciers of the imposing Ladenburg Island, and reached Cape Ritter (19th April), we were disquieted by the observation that the sea-water had permeated the lower layer of snow, whilst a dark water-sky hung over the broad entrance to Markham Sound. On retiring to rest, we distinctly heard the grinding noise of ice, and the surge beating against the shore.

The next day found us on an iceberg not far from the Hayes Islands, with open water in front of us, and no boat to cross it. The water set rapidly towards the north, owing, probably, to the tide. The southern portion of Austria Sound had been converted into a "Polynia," and at a distance of 30 paces from where we stood, the surf lashed the ice. After wandering about for two days, during a fearful snow-storm, we managed, by following the land and the mural termination of glaciers, to go

about this open water which shut off our return; and it was with a feeling of deliverance that we again stepped upon the solid ice near Cape Frankfurt. Our last apprehensions were removed when we found that our vessel had not drifted away, and on the 24th of April we again boarded the *Tegethoff* on the very spot south of Wilczek Island where we had left her thirty days before.

A few days had necessarily to be devoted to repose, for although we had eaten the flesh of eight bears, which we had killed during our journey, this addition to our diet was not sufficient to counterbalance the reduction in our strength brought about by the extraordinary exertions which we were called upon to undergo when dragging a sledge for eight to ten hours at a stretch, and a night's rest of only five hours' duration.

Our third sledge journey was devoted to an exploration of the extensive M'Clintock Island. Brosch, Haller, and myself with the dog-sledge joined in it. When about 40 miles to the west of our ship we ascended a high mountain, and were able to survey the country as far as about long. 50° E. It was mountainous in character, the mountains again bearing a great resemblance to the Ambas of Abyssinia, and attained its culminating point in the Richthofen peak, about 5000 feet in height. Closely-packed ice covered the sea towards the south as far as the eye could reach, and rendered our prospects of a speedy return home by no means cheerful.

On the termination of this journey Lieutenant Weyprecht measured a base-line on the ice near the ship, and we then considered that we had done everything in our power to accomplish the objects of the expedition, and our thoughts were directed exclusively upon our return home.

The period immediately before starting was devoted to recruiting our strength. We took leave of the grave of our departed comrade, and of the country which the caprice of a floe of ice had enabled us to discover. On the 20th of May, in the evening, the flags were nailed to the masts—an affecting scene for all of us—and we started upon our return home. Our equipment was of the simplest, for circumstances forbade anything approaching to luxury, and in addition to the clothes he wore upon his back, the personal property of each member of the expedition was limited to a blanket to sleep in. The provisions, ammunition, &c., for three or four months were packed in three, subsequently four boats, placed on sleighs, and in three large sledges, each weighing about 17½ cwts. Only the two strongest of our dogs were alive by that time; but even this small contingent proved of great service, for they pulled daily 9 to 10 cwts. between them.

The deep snow which was encountered on first starting compelled us to travel as many as five times over certain distances, for it required the united strength of our whole party to drag a single sledge or boat. Having reached the edge of the land-ice, we had to clamber with our boats and sledges from floe to floe, and sometimes to cross narrow fissures in the ice. Persistent southerly winds, moreover, destroyed the little progress we made, for they drove the ice, upon the surface of which we were travelling, to the north; and after two months of incessant labour we were not more than 8 miles from the ship. It almost appeared to us as if our struggle with the ice would end in a defeat, which would compel us to remain a third winter in our ship uncheered by a ray of hope.

The ice around us was closely packed, and on several occasions we were compelled to lie quietly with our boats upon a floe of ice for an entire week, until it should please some channel to open. Northerly winds set in at length on the 15th of July, which dispersed the ice to some extent, continuous rains reduced its dimensions, and by almost superhuman exertions we advanced 10 miles in the course of as many days. We were fully convinced by this time that no vessel would have succeeded in that year to reach the land discovered by us.

On the 7th of August we observed for the first time a swell coming from the south, and indicative of the proximity of open water. This revived our fading hopes, which fell anew when we again became icebound for the space of five days; but on the 14th of August we reached the edge of the pack in lat. 77° 40′ N., and our safety seemed thus to be secured. Here we were reluctantly forced to abandon our sledges, and to kill our dogs who had been our faithful companions and assistants in times of need, for our boats were hardly large enough to hold ourselves and baggage, besides which we were without water and provisions for their maintenance.

Our final salvation is due entirely to finding the edge of the pack-ice in so high a latitude, and, favoured by the wind, we crossed the open sea in the direction of Novaya Zemlya, and followed the coast of that island towards the south. On the 18th of August we, for the first time, placed our feet upon *terra firma,* near Admiralty Peninsula; and on the evening of the 24th, that is, after a passage of ninety-six days, we found ourselves in the Bay of Dunen (lat. 72° 40′), on board the Russian schooner *Nicolai* (Captain Feodor Veronin), who received us with that heartiness which distinguishes the Russian people.

A speedy passage brought us to Vardö, and at three o'clock

in the afternoon of the 3rd of September, 1874, we stepped upon the hospitable soil of Norway, full of that satisfaction which an escape from a position of danger and doubt brings with it.

Scientific Work of the Second Austro-Hungarian Polar Expedition, 1872–4, *by* Lieut. WEYPRECHT.

[Translated from the 'Geographische Mittheilungen,' vol. xxi. p. 65.]

IT is well known that it was not the object of our expedition to reach a high latitude, but to explore the unknown ocean to the north of Siberia. The attainment of Behring Strait would have realised our idea, though we were by no means over-sanguine with respect to that. But, although we have not had the good fortune to come up to our own expectations, we have, nevertheless, by a series of fortuitous circumstances and untoward disasters, been enabled to obtain elsewhere results amply sufficient to console us for any disappointment we may have felt at having failed to carry out our original intention.

When, in 1871, we were preparing to set out on a preliminary expedition to the regions in question, very little was known with respect to the sea between East Spitzbergen and Novaya Zemlya, and although I took every opportunity to examine Finnish seal-hunters and seamen during a six weeks' stay at Tromsö, I was not able to learn anything with respect to the ice there. Only few vessels had then succeeded in crossing lat. 76° N. In the course of our two expeditions we have navigated this unknown sea between long. 40° and 73° E., we have reached lat. 79° at its eastern, and exceeded lat. 80° in its western half; and we have, moreover, discovered an extensive Arctic country, which Mr. Julius Payer explored in sledges as far as lat. 82° N., and sighted as far as lat. 83° N.

The discovery of an open sea, in 1871, to the north of Novaya Zemlya, and which extended to lat. 78° N., mainly led to the second expedition being started. We proposed to explore this sea in an easterly direction, keeping close to the coast of Siberia, and trusted especially to the influence of the large volume of water brought down by the Siberian rivers, in freeing the coast from ice during summer.

The year 1872, unfortunately, turned out to be one of the most unfavourable ever experienced. In lat. 74½° N. we already met with the ice; it was with difficulty we effected our passage as far as Cape Nassau, and finally we found ourselves enclosed in the pack, at a spot where the year before and two years after

no ice was to be seen for a hundred miles round. We never got within the sphere of the Siberian rivers, and are not therefore able to state from our own experience whether our notions respecting their influence upon the ice along the Siberian coast were correct. This question, therefore, remains to be determined by some future expedition. Our experience shows, however, very clearly that the position of the ice between Spitzbergen and Novaya Zemlya varies to so large a degree from year to year, that any expedition taking this route is dependent for its progress to chance solely. This is a consideration which speaks in the strongest possible manner against taking Francis-Joseph Land as a starting-point for future exploration. In 1874 we met the ice almost in the identical positions as during our preliminary expedition in 1871, and it is just possible that a comparison of a series of years might exhibit a certain periodicity.

In explaining the plan of our expedition at a meeting of the Imperial Academy of Sciences, on the 7th of December, 1871, I ascribed the general movement of the ice in the Arctic regions principally to the action of ocean-currents. I have since then abandoned this opinion. Our fourteen months' drift in the pack has shown that, in that portion of the sea, at all events, the influence of the ocean-currents upon the movement of the ice is hardly appreciable as compared with that of the wind. The water of the Gulf-stream undoubtedly enters the large ocean-basin enclosed by Norway, Spitzbergen, and Novaya Zemlya; a glance at an isothermal chart proves this, and the deep-sea temperatures obtained during our preliminary expedition furnish figures in support of it. The existence of the current, however, can no longer be proved from its velocity, but only by the excessive high temperature of the water. The Gulf-stream, therefore, does not regulate the limits of the ice; but it is the ice, set in motion by the winds, which regulates the limits of the warm Gulf-stream, and deprives it of the last remnant of its warmth. A comparison of the drift of the *Hansa* with the direction of the winds will show whether on the Greenland coast as well the drift is due to the winds; in Baffin Bay such is certainly the case, as is proved in figures by Sir Leopold M'Clintock. The velocity of the drift, irrespective of the force of the wind, depends largely upon local circumstances, such as the proximity and nature of the coast and the existence of open water. The great influence of the wind upon the floes is explained by their uneven surface, for every projecting piece of ice serves as a sail.

The circumstances are different in the proximity of land, where powerful currents are frequently met with, which probably

arise partly from the tides, and partly from ice put in motion by winds.

There is an evident tendency of the ice to move from north to south in summer, carried probably by its liquefaction, the water thus obtained flowing off in all directions, and causing the dispersion of the entire mass. But, compared with that of the winds, all other influences are insignificant, and are at most only appreciable so far as their general effects are concerned. Our experience leads us to the conclusion that there exists a continuous ice-stream to the south of Francis-Joseph Land, flowing from the Siberian Sea towards the west; and the winds of last winter have convinced me that, had we not been fixed to the land-ice of Wilczek Island, we should have turned up to the north of Spitzbergen.

The action of the wind, too, probably explains the existence of the open water which stopped Payer's further progress towards the north. In Francis-Joseph Land the winter-storms always blow from the east-north-east, they break up the ice along the western coasts, and thus prevent the formation of thick ice in places exposed to them.

The character of the ice likewise varies considerably in these seas. In the beginning of the summer of 1873, the floe on which we were frozen up was so large that we were not able to see from one end of it to the other. On our return we did not meet with one at all equal to it in extent. In thickness also the ice varied very much during the two summers. Our floe of 1873 consisted of vast accumulations frozen together; it was traversed in all directions by walls of ice, and considerable hummocks projected everywhere. In 1874 the floes had a much more level surface, and although the thaw set in so late that during six weeks we suffered enormously from thirst, it happened frequently towards the close of July that we broke through ice when drawing our sledges. I feel certain that most of this ice must have disappeared by the end of August.

During the whole of our drift the ice surrounding us was packed very closely. A proof of this is furnished by the circumstance that our floe, though continually drifting, did not slue during a whole year; the bow of the frozen-in vessel always pointed to the same direction. Only in September, when our floe had been considerably reduced, it began to slue, but open water of any extent only appeared in October and September, to the south, when we were near the land.

The possibility of again reaching Francis-Joseph Land by ship is a question of the greatest importance. From what has been said, this depends entirely upon the condition of the ice and the state of the weather. An exceptionally favourable

summer is a *sine qua non*, and even then success could be attained only late in the year. In making the attempt, Novaya Zemlya should not be made the starting-point, for the ice drifting to the west will always be more closely packed between Novaya Zemlya and the south coast of Francis-Joseph Land, than further west. My opinion is that long. 45° E. (Greenwich) offers the greatest chances of success, for there, in 1871, the edge of the ice was found 50 miles further north than in long. 60°. During our retreat everything led us to conclude that more open water is to be met with in the west than in the east.

During our preliminary expedition, the signs of land in long. 43° E. and lat. 78¾° N., were so unmistakeable that, when explaining our plan to the Academy of Sciences, I ventured to propose this undiscovered land as a starting-point for a second expedition, the object of which would have been to reach the North Pole. In long. 30° E. lies the mysterious Giles Land. The south coast of Francis-Joseph Land was seen by Payer to extend to at least long. 50° E. I may, therefore, venture to regard all three as being connected. Francis-Joseph Land would, therefore, be of very considerable extent, and that such is actually the fact is proved by the many large icebergs drifting about along its coast. I need hardly observe that the existence of so extensive an Arctic country is calculated to arouse a lively interest in Arctic exploration.

As close spectators we had ample opportunity, in the course of eighteen months, to observe the drifting and formation of the heaviest pack-ice. The phenomena taking place on these occasions are instructive with respect to the ice of the interior Arctic regions.

Excepting the land-ice fixed to the coast and never extending far into the sea, the whole of the ice, floes as well as icebergs, is in constant motion, both in summer and winter, which is mainly attributable to the action of the wind. But owing to differences of shape and size, each floe moves at a different rate, thus giving rise to frequent collisions amongst them. These collisions, and still more the contraction of the ice after a sudden decline of temperature, produce fissures and cracks, and cause the different floes to break up. The broken fragments again are also unequal in their motions, and fresh collisions are the result. If we bear in mind the vast extent of some floes and their enormous mass, we may gain some idea of the colossal forces at play in these processes, and of the consequent grandeur of effect produced. No sooner do these masses come into contact than all their projections and sharp edges are torn off; the different floes are then able to approach nearer to one another, and a contest for existence begins, which, although sometimes decided in a few minutes,

frequently continues for days and even weeks. A wall of ice, formed of irregularly heaped-up blocks and fragments, is thrown up along the edges of the floe, whilst a fringe of ice forms along its lower edge. By degrees the pressure in the pack increases in strength, blocks, 8 feet thick, are forced up to a height of 30 or 40 feet, which, on falling, break into pieces and make room for others. At length one of the contending floes is forced to some distance beneath the other. Sometimes the two floes separate after a sharp encounter, only to renew the contest after a short rest. But the termination of the struggle is always the same: the intense cold binds both into one solid mass, and the two floes become one; but at the next sudden change of temperature, or after a storm, it again breaks asunder, and the former process begins anew. This gives rise to those immense floes, of irregular surface, traversed by ranges of ice-hills, and consisting sometimes merely of blocks of ice frozen together, which constitute the pack-ice filling the interior of the Arctic regions.

Minor irregularities of the floe are filled up by snowstorms in the course of the winter. As soon as the sun of summer begins to exercise its power, the pressure of the ice leaves off. Under its influence the ice-walls built up in winter rapidly get smaller, the ice-blocks exposed to the air are reduced by it, immense masses of ice and snow melt away, and the water resulting from the melting forms fresh-water lakes in the lower and more level parts of the floe. In the course of three summer months the temperature of the air causes 4 feet of ice to melt from the surface, and to that extent the whole floe and everything attached to it (as our vessel) rises to the surface. In the ensuing winter it increases again to the same extent in thickness, by ice forming on its lower surface. The whole of the ice is thus undergoing a continued process of renewal from below to the surface, and we may assume that old pack-ice renews itself in the course of every two years.

The continuous ice-pressures destroy and pile up immense masses of ice in the course of each winter. The openings between the ice are quickly covered with a crust of young ice, and wherever they appear grim winter bridges them over instantly.

Whenever the open water becomes visible through a fissure, a crust of ice is immediately formed, and in the course of twenty-four hours a cold of – 30° to – 40° Reaum. causes it to become 1 foot thick. In consequence of the rapid formation of the ice, the salt contained in the sea-water is only partially expelled. A considerable quantity is frozen in in the upper layers of the ice, and this quantity decreases with the depth in proportion to the

slower progress of the formation of ice. After a certain thickness has been reached, the salt, on coagulation taking place, is almost wholly expelled. In consequence of the presence of salt and the moisture attracted by it, young ice, even of considerable thickness, remains a tenacious, leathery mass, which bends under the foot without breaking; but after very little time the salt effloresces on the surface, which becomes rapidly covered with a white, snow-like layer of salt, attaining by degrees a thickness of 2 inches. The moisture of the salt, even during the most intense cold, continues for some time to be so considerable as to give an appearance of thaw; but in consequence of snow-drifts and evaporation the surface dries up by degrees and the ice becomes brittle.

In this manner nearly the whole of the salt contained in the upper layers of the ice effloresces, and in the course of the ensuing summer it is washed off by the melted water and returned to the sea. All the water resulting from the melting of the ice thus becomes impregnated with salt, and towards the close of summer it has a specific weight of 1·005. It results from this that a smooth ice-surface, such as is formed by fresh water, is hardly ever met with in the Arctic regions, and then only during a short period.

The Aurora borealis affords the finest and most interesting spectacle of these regions, the only change in the dreary long winter nights. Neither pen nor brush is capable of conveying an idea of the splendour and magnificence of this phenomenon at its greatest height. In February, 1874, we witnessed a northern light, which, like a broad stream of fire, rushed from west to east over our zenith, and uninterruptedly shot intensely luminous waves from one side of the horizon to the other. Simultaneously with these we observed sudden outbursts and flashes directed from the southern horizon towards the magnetic pole, and auroral rays followed each other in rapid succession. Altogether it was one of the most magnificent pyrotechnic displays which Nature had here exhibited for our edification.

I shall show further on that the intensity of the Auroras differs in various portions of the Arctic regions, independently of latitude, and that the region visited by us is a maximum one. Even when the sky was serene traces of the Aurora were continually discernible. During the second winter the officers charged with making the meteorological observations kept a journal of the northern lights observed; but as it contained little of positive value it was left behind.

The phenomenon defies description and classification; fresh forms arise continually, and nearly every moment is attended by change. In spite of my endeavours I have never succeeded

in explaining the origin of the Aurora: the phenomenon exists, but how or where it arises it is impossible to tell.

Speaking generally, three forms of Aurora may be distinguished, viz.: (1) steady segments, which rise from the southern horizon, slowly advance over the zenith and pale away in the north; (2) luminous bands, continually changing in colour and position, and consisting either of pronounced rays, or merely of luminous matter; (3) auroras terminating in a corona. Ordinarily the colour of the Aurora is an intense white of a greenish hue; but when it is more intense or in motion, especially when flashes of light are noticed, the prismatic colours are frequently very vivid.

I have expended much time and labour upon spectral observations of the Aurora; but the spectroscope we had with us was not strong enough. I never observed anything but the well-known green line: compared with the spectral observations of the Swedes, who had been furnished with first-rate instruments, ours are of no value.

Most of us traced a certain connection between Auroras and the weather; and intense, especially "flashing" Auroras, were generally the precursors of storms. But whether our ideas are correct can only be seen when the meteorological observations have been computed. I myself look upon the Aurora as a phenomenon taking place in our atmosphere, and dependent upon meteorological conditions; but am not able to adduce any good or valid reasons for my belief.

Magnetic disturbances are closely connected with the Auroras. In our latitudes these disturbances are the exception; in the north they constitute the normal condition, and the needle is scarcely ever steady. This applies to the declination as well as to intensity and the inclination.

As long as we drifted on board the ship, that is, up to October, 1873, the variation instruments could not be set up, as a matter of course. We made, however, several absolute measurements with Lamont's magnetical theodolite, and observed the declination on several days; but owing to the continual disturbances of the needle, which became noticeable on our reaching Novaya Zemlya, we found that none of these observations would be of much value unless we were able to read off simultaneously all our variation instruments.

In November, 1873, after we had become fixed to the land, I had two snow-huts built, and placed the variation instruments in one, the magnetical theodolite and the dip-needle (*inclinatorium*) for absolute measurements, as well as the astronomical instruments, in the other. The three variation instruments for observing declination, horizontal intensity, and inclination, were

furnished to the Expedition by Dr. Lamont, the Director of the Munich Observatory, and they were exactly like the instruments in use there. Dr. Lamont's kind interest in the Expedition is deserving of our best thanks.

Our first trials showed that the method of observation ordinarily in use, viz., reading the instruments at certain hours, would prove utterly useless in the region we were in, for the result would then mainly depend upon the extent of the disturbing influences prevailing at the time. Such readings would neither have furnished a correct average nor a correct idea of the movements of the needles. The days on which magnetical observations were made during former expeditions are too far apart to enable us to draw correct conclusions respecting the magnetic phenomena.

Under these circumstances I took a different course. Every third day, at intervals of four hours, I had the three instruments read from minute to minute during a full hour, selecting different hours on each day. In addition to this, in order to obtain a view of the diurnal movement, we observed twice a month every five minutes throughout twenty-four consecutive hours. In order to obtain, as far as possible, synchronous results, the three instruments (the telescopes of which were fixed to the same axle) were read quickly one after the other, that is, within eight or ten seconds. These observations we made from the middle of January to the end of April, 1874, that is, on thirty-two days, and I believe they will be found to furnish a faithful picture of the ever varying and continual changes as regards the direction and intensity of the magnetic force in these regions.

In order to determine the connection of the Auroras with the disturbances of the needle, a second observer noted the movements and changes of the Aurora, in order that an unbiassed judgment might be arrived at. The variation instruments were checked by absolute measurements of the three constants, whenever circumstances admitted of it.

Irrespective of the observations made during the last Swedish Expedition, but not yet published, ours are the first regular synchronous observations of the three constants observed in the Arctic regions. And whilst all former observations, as far as I am aware, were made with heavy needles, we are the first who have used Lamont's light needles. For observations carried on under circumstances prevailing with us, heavy needles are utterly useless. Even the comparatively light needle of Lamont's theodolite vibrated to such an extent on the occurrence of the least disturbance, as to give quite illusory results.

Almost on every magnetic day there occurred individual disturbances of such strength, that the images of the scales

could not be brought within the range of the telescopes by deflecting them. In order to determine such exceptional disturbance with at least some approach to accuracy, I constructed a separate instrument, by means of which these excessive vibrations could be approximately measured.

Our magnetical observations, for various reasons, cannot lay claim to the degree of accuracy obtainable in observatories established in our own latitude. But it will be easy, guided by our own experiences, so to modify Lamont's instruments that they may be made to furnish sufficiently accurate results, especially if the staff of observers be larger than it was with us.

Altogether we recorded about 30,000 magnetical observations. This material has, of course, to be reduced and sifted. The principal results are as follows:—

Magnetic disturbances are unusually strong and frequent in this region.

They are closely connected with the Aurora borealis; and the more agitated are the streamers, and the more intense their prismatic colours, so much the stronger are the disturbances. Steady segments, sending out no streamers, exercise hardly any influence upon the needles.

During every magnetic disturbance the declination needle was deflected to the east, the horizontal intensity decreased, and the dip increased. Movements in an opposite direction were observed very rarely, and must be looked upon as phenomena of reaction.

These magnetical disturbances are of most overwhelming interest. Whilst all other natural phenomena become known to us through our eyes, ears or touch, that is, through our senses, in this instance observations are required to bring home to us the existence of a colossal force of Nature, which is invested with something fascinating and mysterious, because its emanations and effects ordinarily escape the notice of our senses.

The instrument on which I had based the strongest hopes, viz., the earth-current galvanometer, owing to circumstances under which it had to be used, furnished no results whatever. I had expected to be able to trace a connection between the northern lights and galvanic earth-currents. But as we were 2½ miles from the land I was not able to connect the collecting plates with the earth, but had to bury them in the ice. As ice is not a conductor, they were isolated, and I could trace only a very small influence upon the needle of the galvanometer. This excellent instrument had likewise been furnished by Dr. Lamont. The induction wires were 400 feet in length. Subsequently I corrected a "collector" of atmospheric electricity

with the multiplicator of the galvanometer, but, owing probably to the same reasons, I obtained no results.

The observations for variations were made by Lieutenant Brosch, Sub-Lieutenant Orel, and myself; the absolute measurements by the former and myself.

Our astronomical observations were limited during our drift to the determination of latitude and longitude, the latter being determined by chronometer and, when an opportunity offered itself, by lunars. We only made use thus far of the sextant and artificial horizon. After we became fixed, we set up a small altazimuth, or "Universal Instrument," and time, latitude, and azimuth we determined by means of it. Our longitude was derived from 210 lunar distances, all we were able to observe in the course of the winter. The azimuth of a base-line, 2171 meters in length, and, measured by one with Stampfer's level, was determined by means of the "Universal Instrument" attached to the magnetic theodolite. All these observations were made by Sub-Lieutenant Orel, and I only took a share in the observation of lunars. Determinations of latitude and longitude were made irrespective of temperature, whenever an opportunity offered; and when the mercury of our artificial horizon froze, we made use of blackened oil of turpentine instead.

With reference to meteorological observations, I am able at present to speak only in general terms, for they have not yet been computed. These observations began on the day we left Tromsö, and were continued to the day on which we abandoned our vessel, that is, during twenty-two months. The instruments were read at intervals of two hours, and besides that, at 9 A.M. and 5 P.M., that is, fourteen times in the course of every twenty-four hours. These observations were made by Lieutenant Brosch, Sub-Lieutenant Orel, Captain Lusina, and Captain Carlsen; the engineer, Krisch, took part in them between the autumn, 1872, and spring, 1873, and Dr. Kepes during the last months.

The direction and force of the wind were estimated. I consider such an estimate to be preferable to instrumental observations made in Arctic regions, for by means of it errors are balanced, whilst instruments, owing to snow-drifts, the formation of ice, &c., are subject to an accumulation of errors. Naval men of some experience are able to estimate the force and direction of the wind with sufficient accuracy.

Up to the autumn of the second year the winds were very variable. In the neighbourhood of Novaya Zemlya, we frequently had S.E. and S.W. winds, which in spring veered round towards the N.E. A prevailing direction of the winds was observed only when we found ourselves on the coast of Francis-

Joseph Land. There all the snow-storms came from the E.N.E., that is, more than half of all the winds. They generally brought clouds, which were dispersed only on the wind shifting to the north. We never experienced one of those heavy north storms which were encountered by the *Germania* on the East-Greenland coast, and which appeared to predominate during winter throughout the Arctic regions. Nor did we observe in a single instance a storm of such force as occurs in our European seas several times each winter, as for instance the "bora" of the Adriatic. The winds, as has been observed by all Arctic voyagers, are stilled by the ice; and frequently the clouds might be observed scudding along at an inconsiderable height, whilst on the surface there was almost a calm.

I must here draw attention to a curious fact. I have above referred to the influence of the wind upon the ice. We have observed the strange fact that ice never drifts exactly in the direction of the wind, but always to windward. Thus, a north-east wind drifted us towards the north instead of to the south-west; a south-west wind to the east, instead of north-east; and a north-west wind to the south, instead of south-west. This took place without a single exception whenever there was wind. I am not able to explain this phenomenon from ocean-currents, or from deflection produced by the neighbourhood of the coast, as the operation of these would cause contrary winds to produce a contrary deflection.

The struggle between the cold northerly and warm southerly winds in January, before the continued and intensely cold weather, is likewise most interesting. The warm south and south-west winds brought masses of snow, and caused the thermometer to rise within a short period to the extent of 30° and 35° Reaum.

With respect to our barometrical observations little can be said until they have been reduced. We noticed considerable oscillations, but definite conclusions can be drawn only from the figures.

We had three syphon and four aneroid barometers. Daily, at noon, Lieutenant Orel read off five of these instruments, the observations at the intermediate hours being made with an aneroid.

Our thermometers were suspended at a distance of 25 paces from the ship, 4 feet above the surface of the snow. The maximum thermometer excepted, all were filled with alcohol, and were supplied by Cappeller of Vienna. They were frequently compared with a delicate normal thermometer supplied by the same mechanician.

A minimum thermometer was read off daily at noon. During

summer, a black-bulb thermometer was exposed to the sun. In addition to this, I frequently exposed, during winter, covered and uncovered minimum thermometers for observing the nocturnal radiation during low temperatures.

The lowest mean temperature, in both years, took place in February; January, strange to say, being warmer than December or February. The temperature during winter varied considerably, and a sudden fall or rise was by no means rare. In summer, on the other hand, the temperature was constant, and variations were of small extent. The warmest month was July. The greatest cold observed was $-37\frac{1}{2}°$ Reaum. ($-52·37°$ Fahr.).

The influence of such extremes of temperature upon the body has frequently been exaggerated. We read about a difficulty of breathing, pain in the chest, and so on, but we have observed nothing of the kind. Although most of us were born in the south, we bore the cold with ease, and several sailors never put on their furs. Even during the greatest cold we smoked our cigars in the open air. The cold only becomes insupportable when it is accompanied by wind, and the latter always causes the temperature to rise after a time. The impression made by the cold varies, however, according to the moisture of the air and personal disposition. The same degree of cold may therefore prove very unpleasant on one occasion, and a matter of indifference on another.

In observing the moisture of the air we made use of the ordinary psychrometer, the dry and wet bulb. When the temperature is low, observations made with these instruments cannot any longer be trusted, and we therefore ceased making observations in winter, as the most trifling error exhibits great difference in the absolute moisture.

In order to gain some insight into the evaporation of the ice during winter, I exposed cubes of ice to the open air, and determined their loss of weight every fortnight.

The air, during winter, appears always to contain ice-atoms. This is seen not only in the case of mock-suns and mock-moons, when the sky is clear, but also whilst making astronomical observations. Our telescopes but rarely enabled us to see the stars as clearly as in our own latitudes, although the moisture of the air was far less. It frequently happens that very fine needles of ice are deposited even when the sky is perfectly serene.

It was quite impossible to measure the amount of precipitation as, during snow-storms, it is impossible to make a distinction between snow falling from the sky and snow drifted by the winds. The quantity of snow was remarkably small during the first winter, when we were at a distance from the land, whilst during the second winter, close to Francis-Joseph

land, our ship was almost buried under it. The difference in the fall of rain during the first and second summer was equally remarkable. During the first summer a little rain fell only late in the year; but during our retreat torrents of rain poured down as early as July for days in succession.

The clouds, as a matter of course, differ from what is observed with us, and neither the heavy nimbus nor cumulus was observed. The clouds have either that uniform dreary grey of rising fog, or are cirri. The latter, however, never resemble the cirri of our own climes, but consist of puffs of fog suspended at a moderate height, and never exhibiting that strictly defined shape as with us. The clouds are replaced in the north by dreary fogs, sometimes at a small height above the ground, at others as if they were nailed to it. A clear sky for twenty-four hours in succession is scarcely ever met with in summer; and the sun, having appeared for a few hours, is swallowed up again by dense masses of fog. These continual fogs are certainly most depressing; they exercise a great influence upon the ice, for they absorb the warmth of the sun, and are more destructive to the ice than its direct rays would be.

Mock-suns and mock-moons were observed frequently, and were always regarded as certain precursors of early snow-storms. New phenomena of this kind we only observed on one occasion, when in addition to the double system of mock-suns there appeared two additional suns on a level with the true one.

We made soundings along the whole of our track, and found that the depth of the sea increased as we proceeded east. At our easternmost position, in long. 73° E., the depth was 400 meters, and thence towards the west it decreased gradually. Facing Francis-Joseph Land there lies a bank, which appears to extend to Novaya Zemlya, and beyond it the depth again increases to some extent. The sea to the east of Spitzbergen is shallow, and does not exceed 150 meters in depth. By means of an apparatus specially constructed for this purpose by Lieutenant Hopfgarten, specimens of sea-bottom were brought up on many occasions.

In connection with our soundings we made deep sea temperature observations with Casella's minimum and maximum thermometer. These were continued during winter, and they exhibited a slight increase of temperature with the depth. We likewise made observations respecting the salinity of the sea-water at different depths.

Up to the time our vessel became fixed in the ice we likewise observed the surface temperature of the sea. Speaking generally, too much importance is attached to these observations, for the results depend mainly upon the state of the

weather. It is certainly a mistake to infer from these observations the existence of the warm or cold ocean-currents.

We frequently used the dredge during our drift, and generally allowed it to dredge the ground for half a day at a time. The collection from our dredging probably affords a very fair picture of marine life at the sea-bottom of the regions explored. In some cases there was such an abundance of life that the dredge reached the surface filled to the brim. The crabs exhibited the greatest variety, but the larger specimens caught had to be left behind. The collection was arranged by Dr. Kepes, and handed over to the Academy of Sciences on our return, who at once caused it to be placed in the hands of *savants* for examination.

Our other collections had to be abandoned; but they were not considerable, as we touched land only in winter, when snow covered the entire surface. We had a fair collection of bird-skins, but excepting a rapacious sea-gull, which Dr. Kepes was not able to make out, it contained only known species. Our bear-skins, properly dressed and packed up, were of great value. They numbered sixty-seven, including a few splendid specimens, and were mostly winter-skins, which but rarely reach European markets, and are much finer than the summer dress.

The higher animal life is poor in these seas. The ice-bear and seal are its chief inhabitants: the former exists in such numbers that we were not able, during winter, to leave the ship unarmed. The ice-bear sometimes caused us unpleasant surprises; but, speaking generally, he was a welcome visitor, as he supplied us with a wholesome, strengthening food. We observed two species of seal (*Phoca barbata* and *Phoca Grœnlandica*) wherever open water existed; but they are insufficient in number to make seal-hunting a profitable occupation. The walrus was seen only once, near Francis-Joseph Land, although we frequently found ourselves in localities most favourable to its existence. Of the whale species we only met with the white whale, near the coast, but pretty often.

Birds were numerous near the land; but in proportion as we travelled away from it their numbers decreased, and during the last few days of our retreat the sight of a bird was exceedingly rare.

But whatever interest all these observations may possess, they do not possess that scientific value, even supported by a long column of figures, which under other circumstances might have been the case. They only furnish us with a picture of the extreme *effects* of the forces of Nature in the Arctic regions, but leave us completely in the dark with respect to their *causes*. As regards the latter we are as much in the dark as before, simply because we have no synchronous records that might

furnish a clue to them. It is only the latter that enable us to draw inferences on the causes, the origin and essence of those abnormal phenomena observed in the north. The key to many secrets of Nature, the search for which has now been carried on for centuries (I need only refer to magnetism and electricity, the greatest problems of meteorology), is certainly to be sought for near the Poles. But as long as Polar Expeditions are looked upon merely as a sort of international steeple-chase, which is primarily to confer honour upon this flag or the other, and their main object is to exceed by a few miles the latitude reached by a predecessor, those mysteries will remain unsolved.

Discovery and topography, which have hitherto constituted the main objects of Arctic Expeditions, must yield precedence in the future to these great scientific problems. But no solution can be looked for until the several nations, which claim to participate in the scientific efforts of our age, agree to lay aside their rivalries, and combine for the common good of mankind. Decisive scientific results can be attained only through a series of synchronous expeditions, whose task it would be to distribute themselves over the Arctic regions, and to obtain one year's series of observations made according to the same method. Only thus shall we be placed in possession of materials enabling us to attempt a solution of the problems which now lie embedded in the Arctic ice; only thus shall we receive a return for the immense amount of labour, for the efforts, the privations, and the wealth already wasted upon the Polar regions.

Polar navigators are divided as regards the means for attaining the highest latitudes, one party advocating the use of sledges, the other that of a ship. When it is merely a question of attaining the highest latitudes, the sledge may deserve the preference; but when higher scientific objects are to be pursued, the ship alone can afford a sure basis. Nor is it possible fully to combine both purposes, for one of them must always be made subordinate, and will thus prove an obstacle to the pursuit of the other.

In conclusion, I take this, the earliest opportunity, of expressing my public thanks to the several officers of the Expedition, to whose indefatigable perseverance, and to whose exertions under the most difficult and often under the most dreary circumstances the results and observations discussed in this paper are solely due.

II.—*Inference applied to Geography, with special reference to Ocean Currents and the Arctic Regions.* By General HAUSLAB, Vienna, Honorary Corresponding Member R.G.S.

LOOKING to the high interest just now attaching to the unknown Polar regions, I propose in this paper to venture upon certain deductions with respect to them, and thus to apply deductive inference to the solution of a geographical problem.

In doing so I shall largely avail myself of maps and diagrams; for in starting hypotheses it is easy enough to make assertions which would not bear the test of being embodied in a diagram. What should hinder us, for instance, from asserting that there is such a thing as a square circle, though an endeavour to draw one must inevitably lead to failure?

In discussing this subject, I must first of all inquire into the natural laws governing the motion and currents of water, and trace the anomalies between rivers and the sea.

Fig. 1, Plate I., shows the bottom of the Adriatic, which is perfectly well known. It will be observed that it consists of three distinct basins, separated by three submarine plateaux,* the position of which is indicated on the Italian and eastern shore by striking promontories or headlands.

A river flowing over a country having such a configuration would naturally form its channel along the deepest parts, as shown in Fig. 2, but not so an ocean current. The latter actually runs close along the Dalmatian coast to the north, and then returns along the coast of Italy to the south (Fig. 3). The explanation of this phenomenon is as follows:—

The Greek current coming from Corfu strikes the submarine plateau, which extends from Brindisi to Capo Linguetta. There it bifurcates; one portion being turned back towards Capo di Santa Maria, the southern cape of Otranto, the other flowing over the plateau into the first basin referred to. The latter, in accordance with its *vis inertiæ*, ought to continue its direct course towards Brindisi, but a current flowing to the west of it (and to be referred to presently) presses it towards the coast of Dalmatia.

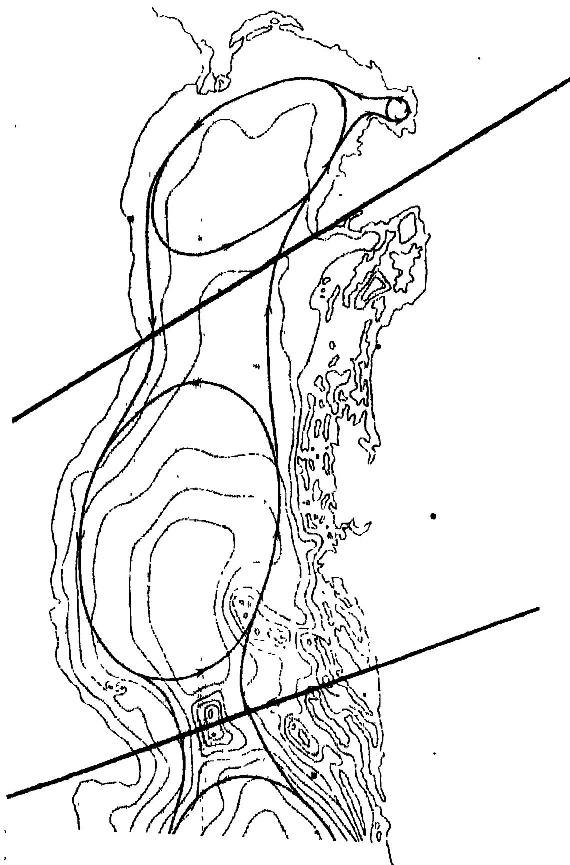
It continues along this coast until, beyond Cattaro, it encounters the second plateau, which extends from Monte Gargano to the Isola Lagosta. There it again bifurcates; one portion turning back to join the current running along the

* The northernmost of these, that between Ancona and Istria, is not very distinctly shown on our chart, because it lies between two contour-lines.

Plate I.
to face page 34

Fig. 3.

CURRENTS IN THE ADRIATIC SEA



Italian coast, the other crossing the plateau and continuing to flow to the north. The Italian current, after receiving this reinforcement, is not able, in its southerly course, to cross the plateau between Brindisi and Capo Linguetta, but a portion of it is diverted towards the Dalmatian coast; and thus is formed the eddy or circuit current within the southernmost of the three basins. That portion of the Dalmatian current which crosses the plateau between Monte Gargano and the Isola Lagosta meets the plateau extending between Ancona and Istria, bifurcates, and is thus the cause of a similar circuit-current in the centre basin. A third circuit current is formed in a similar manner in the northernmost basin, and minor currents and circuits, all due to the action of the same law, are met with between the numerous islands skirting the coast.

If we look at the general features thus presented by the Adriatic, we find that there are three principal circuit currents indicating the positions of the three basins, and separated by four-sided figures having their sides curved inwards, and bounded by currents flowing in contrary directions. These latter indicate the positions of the plateaux. Let us impress upon the mind these features, in order that we may recognise them should we meet with them in other parts of the globe.

The phenomena of these Adriatic currents are well known, but they can neither be explained by the law of gravitation nor by the rotation of the earth; for though the waters are pressed upon the coasts, both towards the east and west, the general direction of their circulation is north and south.

We must, therefore, seek for some other cause to explain their existence.

A simple experiment with a glass of water proves to us that, owing to the mobility of its molecules, water does not simultaneously follow the movements of the vessel containing it. This retardation, produced by the earth's rotation, is assumed to explain satisfactorily the westerly equatorial currents.

But the earth does not merely rotate, it also oscillates, owing to what is known as the nutation of the earth's axis. The water, not being capable of following this movement, however small, lags behind, and thus currents are produced.

If we cause a basin containing water to oscillate in four directions, the water will describe an eddy or circuit current.

This leads me to the conclusion that *the circuit currents of the Adriatic are due to the nutation of the earth's axis.*

Let us now compare the currents of the Adriatic with those of the Ocean.

A warm easterly current flows from the Indian Ocean. At

Madagascar it bifurcates. One branch turns north, passes to the south of Ceylon, and rejoins the parent current near Sumatra; thus forming a circuit. The second branch continues to the Cape of Good Hope, where it bifurcates, one branch running up the western coast of Africa; the other, having joined a cold easterly current, flows to Australia, and thus likewise completes a circuit.

The cold north-easterly current referred to bifurcates to the south of the Cape, sending one branch to the east, and the other to the north; and thus forming a four-sided figure with sides curved inwards, such as we have already observed in the Adriatic.

The combined Indian and Antarctic current flows north along the west coast of Africa, gradually increasing in temperature as it approaches the equator. On meeting the eastern promontory of South America, this current bifurcates; one branch flowing south, along the east coast and then towards the east, past Tristan da Cunha, thus constituting a South Atlantic circuit current.

To the north of the equator, owing to the predominating influence of rotation, the law is modified, but only in as far as the direction of the currents becomes retrograde. The second branch of the African current, after having traversed the submarine plateau joining Africa and America, does not flow east to Spain and Ireland, and then describe its circuit by following the coasts of Newfoundland and the east coast of North America, but, owing to the influence of rotation, it enters the Gulf of Mexico and gives rise to the warm Gulf Stream. The latter flows in an easterly direction towards Europe, sends one branch to the coast of Ireland, and another past Portugal and Africa, and thus forms the circuit of the North Atlantic.

North of the submarine plateau which joins Ireland to Newfoundland, the influence of rotation ceases, and the currents therefore flow north along the eastern coasts of Scotland and Norway to Novaya Zemlya, and then turn back to the south, past the southern extremity of Spitzbergen, along the west coast of Greenland, as far as Cape Farewell, and thence to Newfoundland. Where these currents flow over the two submarine plateaux connecting Norway, the Faroe Islands, Iceland and Greenland, and the North Cape, Bear Island and Spitzbergen, we again observe the four-sided figures referred to, whilst the intervening basins are traced out by circuit currents.

Davis Strait and Baffin Bay furnish almost an exact counterpart to the currents of the Adriatic.

In the Pacific, two equatorial currents are produced by rotation; and there are circuit currents in the south and north

basins of that ocean, the latter sending off a warm branch through Behring Strait into the Polar basin.

In the Pacific, as in the Indian Ocean, the preponderance of rotation modifies our law; and the currents in its northern basin are retrograde.

In the comparatively undisturbed centres of all these circuit currents, accumulations of fucus are met with, and where these are found, we may infer from them the existence of a circuit current.

There remain to be explained the East-Equatorial counter-currents.

The assertion that the surface of water is horizontal, is true only of water in a state of perfect repose. Every movement causes the water to form cavities and elevations, varying in degree according to the forces acting upon it; and in that condition water will flow, not only downwards, but likewise upwards.

If we stir a glass of water with a spoon, a funnel is formed in the centre, more or less deep, according to the rapidity of our movement.

When impelled by a force acting from behind, or when subjected to the attraction of the sun and moon, water moves upwards, *i.e.*, to more elevated places.

Every fountain, and the rise of the flood-tide, prove this.

A rise or swell of water may be caused by pressure from the rear or an attractive force in front. In this case, the molecules impelled at a less rapid rate slide down on the sides.

If there are two such "swells" parallel to and at some distance from each other, a cavity or channel will be formed between them, into which the molecules slide from the top of each swell.

This fact may possibly explain the easterly direction of the counter-currents of the Atlantic and Pacific, enclosed as they are by two westerly rotation-currents, which swell on coming into contact with the East and West India Islands.

The currents in the Gulf of Arabia, the Bay of Bengal, and in the Indian Ocean generally, vary according to season, probably in consequence of the variable direction of the monsoons.

Lastly, the remarkable fact of the heavier cold Polar current dipping under the lighter southerly current near Newfoundland is deserving of attention. The measurements of the *Challenger* have shown that this retrograde under-current flows at an inconsiderable depth below the surface of the sea near Halifax and New York, and that its direction is subject to the same laws as that of the surface-currents.

The rotation of the earth impels it towards the coast of

America, for near Sombrero it is much nearer the surface than at Teneriffe. It likewise, on coming from the north, strikes the submarine plateau joining Africa and America, which causes it to bifurcate. Its western branch crosses the plateau, and rises to the surface near Pernambuco and the Abrolhos Islands; whilst its retrograde branch, as far as lat. 3° 8′ N., long. 14° 49′ W. of Greenwich, is at a far less depth than in the centre of the North-Atlantic basin and at St. Vincent; and it consequently rises to the surface to join the equatorial rotation-current.

In the North-Atlantic basin, the cold southerly deep-sea current runs in a direction contrary to that of the warm northerly surface-current; whilst in the South-Atlantic basin both run in the same direction, the water under the equator being thus replenished from the south, and the retrograde movement effecting a thorough circulation of the waters of the globe.

We are thus able to form a general conception of all ocean-currents, and find that phenomena, like those observed in the Adriatic, recur everywhere, and depend therefore upon the same law.

On further consideration, we cannot fail being struck by a number of instances in which currents run in the same direction.

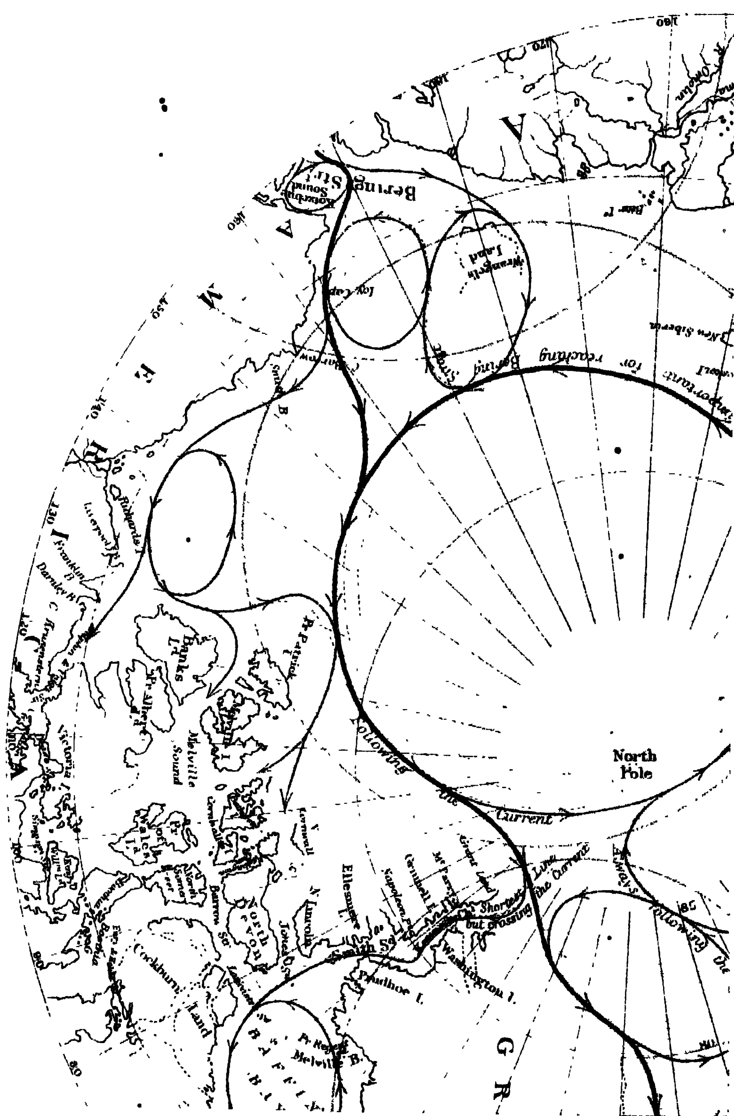
The currents along the west coasts of Ireland and England run to the north; on the east coasts of these islands they run south. In the Channel the currents are modified by the tides, so as to follow its direction; flowing sometimes to the west, at others to the east. The currents encircling Iceland, Spitzbergen, and Novaya Zemlya, likewise ascend along the western shores, and descend along the eastern. It would therefore appear that in the North Atlantic, the effects of rotation not any longer predominating, currents, as a rule, and in accordance with the law referred to, flow in a northerly direction along the western coasts of the islands, double these islands in the north, and return south along the eastern coasts; and that the circuit-currents in the basins between them flow in the contrary direction, that is east, north, west, and south.

It is very much to be regretted that observations on ocean-currents are comparatively rare and frequently untrustworthy, and that due attention has not hitherto been bestowed upon this subject.

It results from all that has been stated that currents, and the movement of water generally, cannot be traced to a single cause, but are the product of several factors, whose influence varies. These factors are:—

Gravitation (which impels water to seek the lowest level).

MAP OF THE NORTH POLAR REGIONS



The configuration of the sea-bottom.
The rotation of the earth.
The nutation of the earth's axis.
Pressure applied from the rear.
The attraction of sun and moon.
The temperature of the sea-water.
The direction of the winds.
The disturbance of the equilibrium and its restoration.

The salinity of the sea-water (its specific weight) is likewise said to exercise some influence.*

Before I venture upon deductive inferences respecting the unknown Polar regions, I beg to submit to your notice a second law of nature respecting the outward shape of the inequalities of the earth's surface, which I first explained at a meeting of the Imperial (Austrian) Academy of Sciences, a short time ago.

This law is as follows:—By prolonging certain mountain chains, and connecting them with isolated heights in a natural manner, we are able to prove, by reference to maps, that there existed on the earth's surface annular mountain chains, similar to those discovered on the moon; that these chains are proportionate in size to the size of our planet; and that both, those of the moon and of the earth, must therefore owe their origin to the operation of the same law.

I advisedly eschew the use of terms such as volcano and crater, which point to origin, and use that of annular mountain chains instead, which applies merely to configuration.

The curved chains of the Aleutian Islands, the Kuriles, the Japanese Islands, the Marianas, the West and East Indian Islands, the circular shape of China, of North-Western Africa and the river-basin of the Amazonas and Orinoco are amongst the most striking instances attesting the existence of such annular mountain chains.

If we complete the circle of which the Aleutians form an arc, it will be found to cross Barrow Point and the Cape near the Medvieshi Islands, and this proves that the law referred to has operated in the Arctic Regions also.

In former ages these annular mountains were submerged, flooded, which partly caused their destruction, and all that remains of them are mere fragments which we are obliged to search for and put together.

Plate II. A circle passing through Behring Strait, Iceland, and the Isthmus to the north of Great Bear Lake, will be found

* One of the most marked examples of the influence of salinity upon Oceanic phenomena is offered at the mouth of the La Plata, where a light, fresh-water delta overlies the southern Brazilian current, which only reappears on the coast of Patagonia.

to intersect the heights between the Sea of Okhotsk and the Arctic Ocean. The River Lena avoids it by turning towards the east, and breaks through it only at Yakutsk; the Kengui and Vilyui have a similar course; the upper and middle Tunguska, as well as the Ob, do so likewise—but towards the west—finally breaking through, the former below Tungusk, the latter below Troitskoi. All these rivers, as well as the heights running along them, conform to the direction of our circle. Further west the circle intersects the culminating points of the northern Ural, separates Lake Onega from the White Sea, and crossing the Gulf of Bothnia where it is narrowest (at Wasa), continues to Trondheim.

It then crosses Iceland longitudinally, strikes Cape Tycho Brahe on the coast of Greenland, and crosses the narrowest parts of Davis Strait and Fox Channel. Chesterfield Inlet, Dease and Simpson Strait, the Coronation Gulf and the north-west coast of America as far as Cape Barrow, mark out its return to Behring Strait.

The circle described I look upon as the centre axis of an annular mountain chain surrounding the whole of the Polar basin, and within (as on the moon) there may be traced three similar chains of smaller dimensions.

The first of these passes through Cape Brewster (in Scoresby Sound, East Greenland), Jan Mayen, the west coast of Spitzbergen, Mount Parry, Napoleon Point, the shore of Kennedy Channel, and the eastern shore of Smith Sound to Prince Regent Sound.

Of the second annular chain we are able to trace only the western shore of Prince Patrick Island, Barrow Point, Wrangel Land, and the Kotelnoi Islands.

The third chain can be traced more fully. Starting from the southern extremity of Spitzbergen it passes through Bear Island, Hammerfest, and along the southern bow-shaped coast of the White Sea, then joins the first of our chains, crosses the heights between Ob and Yenisei, and strikes the long-necked cape Chelyuskin.

Within this latter chain there are again several others of a subordinate order.

One of these passes through the whole of Spitzbergen, the Bear Island, North Cape, along the east coast of Lapland, the Kanin Peninsula, the south coast of the Kara Sea as far as White Island, and thence crosses over to the newly discovered Francis-Joseph Land, which thus forms part of the circumference of an annular mountain chain.

A second annular chain followed Novaya Zemlya, embraced the crooked arm of the sea at the mouth of the Ob and, passing

through White and Waigat Islands, enclosed the basin of the Kara Sea.

The East Spitzbergen Sea likewise constitutes such a subordinate basin, bounded by Stans Foreland, the North Cape and Novaya Zemlya.

The annular chains enable us to determine the positions of the submarine plateaux separating the ocean basins. These plateaux are nine in number and extend as follows:—

1. From the North Cape by way of Bear Island to Spitzbergen.
2. From East Lapland to Novaya Zemlya.
3. From Admiralty Peninsula to Novaya Zemlya and King Charles Land.
4. From the southern extremity of Novaya Zemlya, by way of Waigat Island, to the main land of Siberia.
5. From Novaya Zemlya to White Island.
6. From the northern extremity of Novaya Zemlya to the coast of Siberia East of the Ob and Yenisei mouths.
7. From White Island, past the north-east cape of Novaya Zemlya, to Francis-Joseph Land.
8. From Francis-Joseph Land to Spitzbergen.
9. From Cape Chelyuskin to the north cape of Spitzbergen.

Francis-Joseph Land, Gillis Land, King Charles Land, and Spitzbergen, probably constitute a single group of islands.

Where three of these basins meet, a triangular plateau will be met with, and in these positions land, or at all events a shallow sea, are likely to be discovered.

If we compare the unknown space between Spitzbergen and Behring Strait with the Adriatic, or with other portions of the ocean, we are able to trace many analogies, and these enable us to form deductions respecting the discoveries likely to be made there.

Speaking generally, the whole area under consideration will probably turn out to be a gulf rounded off at the end, similarly to the Adriatic; and as the Po enters the latter, so will the warm China current passing through Behring Strait be found enter the former.

Compared with its vast area, the entrance to this Arctic gulf is but narrow. Norway and Greenland occupy the same positions with respect to it as do Brindisi and Capo Linguetto with respect to the Adriatic, and Pelagosa Island, lying within the entrance of the latter, has its counterpart in the Spitzbergen group of islands. As in the Adriatic, where the current flows north along the eastern shore and returns south along the western, so in the Arctic basin, where the warm current flows north along the coast of Norway, whilst a cold current is discharged in a southerly direction along the Greenland coast.

In our remarks on Oceanic circulation we have proceeded north as far as the submarine plateau connecting Spitzbergen and the North Cape, and will now continue our investigation.*

The submarine plateau just referred to is crossed by a current flowing round North Cape and along the Lapland coast. This current, on reaching the eastern termination of the East Spitzbergen Sea, strikes against Novaya Zemlya, follows it as far as the submarine plateau, joining that island to King Charles Land; and it is then deflected towards the north and west in the direction of Spitzbergen. A portion of it, however, crosses the plateau, and has been traced as far as Orange Island and beyond (see 'Mittheilungen,' 1871, Plate 12); it then turns south, and forms an eddy or circuit-current in the Kara Sea. The latter has been found free from ice to the north of White Island, and of the Ob and Yenisei mouths, and the temperature of the surface-water in September exceeded 6° Cent. ('Mittheilungen,' 1872, Plate 19).

The left branch of the current is, however, deflected by the submarine plateau connecting White Island with Francis-Joseph Land and Spitzbergen (see Plate IV.), and, after having flowed for a certain distance towards the north-east, it turns back to the north and west, and forms a circuit-current extending to Cape Nassau.

This circuit-current explains the involuntary voyage of the *Tegethoff*, and led to the discovery of Francis-Joseph Land. When that vessel had reached the bifurcation of the main current, it found itself in an eventful situation. Had fate guided it into that branch of the current which flows past the north cape of Novaya Zemlya into the next basin, it would either have got into the power of another circuit-current produced by the submarine plateau stretching north from Cape Chelyuskin, or it might have crossed that plateau likewise and entered the great Polar basin, when currents would have carried it north of New Siberia, Wrangel Land, and Prince Patrick Island, right over to the North Pole, back to Chelyuskin!

The second branch of the current under consideration crosses the submarine plateau connecting Grant's Land and Cape Chelyuskin, and descends along the north and east coasts of Greenland towards Iceland.

The warm Japanese current enters the Polar basin, and the cold easterly currents running between the North American islands are discharged from it into Baffin Bay.

This great basin, no doubt, has its minor basins, and perhaps

* Consult for what follows the maps in Petermann's 'Mittheilungen' for 1869 to 1874.

islands, but the facts at our command are not sufficient to enable us to make deductions with respect to them.

In its main features we may suppose it to resemble the basins of the North and South Atlantic, the centre being open, with scattered islands, like the Azores, Bermudas, Ascension, St. Helena, Trinidad, and Tristan da Cunha, scattered along its margins.

We might further suppose that the central group of islands—consisting of Spitzbergen, Francis-Joseph Land, and, perhaps, some undiscovered Polar land, which is separated from Siberia by an arm of the sea, has some connection with Greenland or North America; but, if this were the case, the large masses of ice encountered on the east coast of Greenland must originate to the south of Francis-Joseph Land and Spitzbergen, which they certainly do not; and we may, therefore, suppose that a wide channel connects the sea to the west of Spitzbergen with the interior Polar basin, through which they find an outlet.

When Lieutenant Payer returned from Eastern Greenland I showed him these my comparisons and deduction. I observed to him that a direct westerly route appeared to offer but few chances of success, but that, by going eastward, in the direction of the currents, it was more easily attainable. He seemed to agree with me.

Subsequently, on May 9th, 1871, I exhibited my diagrams at a meeting of the Vienna Geographical Society, of which a report is to be found in the 'Mittheilungen' of that body. Part VI., p. 304.

The accidental discovery of Francis-Joseph Land has not led to a final solution of the Arctic question, but furnishes facts which enable us to infer the unknown from the known, and whether discoverers add to our store of knowledge under the equator or within the Arctic circle, we are equally indebted to their courage and endurance.

In looking to the further pursuit of Arctic exploration, the following considerations may be deserving of attention.

Crystallization is promoted by contact with solid objects. Hence the coasts are fringed, as it were, with a band of ice, and where the arms of the sea are narrow, even they become occasionally covered with ice to their whole extent.

Vessels, consequently, find it difficult to approach the coast.

On the other hand, the centre of the sea, for instance that of East Spitzbergen, is generally free from ice during summer. On this account coasting voyages are not to be recommended.

Motion is the enemy of crystallization, and we do not yet know what degree of cold would suffice to cov.. extensive

surfaces of agitated water with a sheet of ice. Open water has been discovered at the northern extremities of Francis-Joseph Land, Spitzbergen and Grant's Land; and it is therefore possible, nay probable, that the centre of the great Polar basin is periodically free from ice.

The temperature in the highest latitudes hitherto reached admits of animal and vegetable life, and it is therefore hardly likely that 7° farther to the north, that is at the Pole itself, it should be quite extinct. It appears that a low daily temperature not interrupted by cold nights, may exercise as favourable an influence upon the growth of plants as a fluctuating higher temperature succeeded by cold nights.

Several routes lead into the Polar basins, but explorers should in every case follow the ocean-currents and not proceed in a contrary direction. They should do as the ferryman, who first ascends one bank, and then allows himself to be drifted to the other, and not sail right across.

Nor is the shortest route always the most advantageous, for the aid of currents may compensate for long detours.

We have already seen that one of the routes leads past Novaya Zemlya, the north cape of which has already been doubled by Johannesen. The same route might be reached through the Kara Sea or from the mouth of the Ob or Yenisei. Having succeeded in gaining the sea to the east of Novaya Zemlya, it becomes necessary to double Cape Chelyuskin, in order to enter the great Polar basin. There is another route into this basin from the mouth of the Lena.

The route through Behring Strait would not probably oppose great difficulties to an attempt at reaching the current flowing past Patrick Island to the North Pole.

Hall, amongst all explorers, has up to the present time attained the highest latitude, and as he found an open sea he might have succeeded in reaching the Pole itself had he kept to the west instead of to the east. There is probably no land between Hall's furthest and the Pole, but the direct route, for some distance, runs counter to, or across the current which carries such masses of ice down the east coast of Greenland, and this current might create great, if not insurmountable difficulties to an explorer:

If my drawings and inferences are not altogether erroneous, Patrick Island, or the North Cape of Spitzbergen, would appear to offer the most advantageous base for penetrating to the Pole. If the Spitzbergen be chosen, the ship would be carried by a current to the north-west, and, having crossed the submarine plateau extending between Grant's Land and Cape Chelyuskin, the attainment of the North Pole would prove comparatively

easy. Parry's route was too direct northerly; had he penetrated a little further, he might have discovered land.

In concluding these remarks on the probable nature of the Polar Regions, I must crave your kind indulgence on account of the difficulties attending the subject.

III.—*Journey to Umzila's, South-East Africa, in* 1871–1872. By MR. ST. VINCENT ERSKINE, Special Commissioner from the Natal Government to Umzila, King of Gasa.

[ABRIDGED.]

[*Read*, January 11th, 1875.]

AT the outset it will not be necessary to remark—as I shall farther on—upon Captain Elton's report of his journey. It is sufficient to premise that I differ from him in many particulars, especially as to the navigability of the Limpopo. Contemporaneously with my journey, of which this is an account, Mr. Carl Mauch, the noted German explorer, with whom I had the pleasure of travelling over some part of my former tour, discovered the ruins of Zimbabye or Zimbaoe, supposed to be the ancient city of the Queen of Sheba, which name is similar to that of the river Saba or Sabia, upon whose banks (or rather those of an affluent, named Tokwe) these ruins are said actually to stand.

Mr. Mauch's researches place these ruins within 42 miles of my calculated position when at Umzila's kraal, which was determined by several celestial observations by the stars and sun, to be in lat. 20° 23′ S., and long. E. 32° 30′ by dead reckoning; about 25 miles to the east of the Sabi River. I neither heard anything of the ruins after repeated inquiries, nor of Mr. Mauch himself. I am therefore surprised to read in his account that he supposed himself only six days' walk from Sofala; whereas the natives informed me that I was at least eight days walk distant from Sofala, Mr. Mauch being still to the westward of my position by his own account, *i.e.* west of the Sabi. Unfortunately the lunar distances determining the true longitude of Umzila's kraal taken by me (being eighteen sights, or three sets east and three sets west), have been totally lost in a waggon, in crossing a flooded river in Natal, together with all my note-books except the map.

The following Journal is therefore composed entirely from memory. Such latitudes as are given are partly from recollec-

tion, but mostly from the map which I saved; and the longitudes from a remembrance of the dead reckoning. They can therefore have no pretensions to such exactness as otherwise might have been attained. In some cases my companion's notes have assisted me; but as they were not copious, I have obtained thence little more than dates and reminders.

It is my opinion that Zimbaoe is placed by Mr. Mauch at least 30 or 40 miles too far to the east; and that instead of being 164 miles from Sofala, it is distant about 200 nautical miles, as stated by the old geographers. Nevertheless, Mr. Mauch's route has filled up a great blank in the map of Africa, and doubtless his journey to Senna, whither I understand he afterwards went from Zimbaoe, will contribute still more. He started apparently about the 8th of June; but as I was at Umzila's from the end of March to the end of July, I should have heard if he had passed by near there; whereas I did not, though I was constantly inquiring for white travellers.

I had never ceased to regard the north of the Limpopo, and the large blank on the map between it and the Sabi, as my field of exploration. I had written to the Royal Geographical Society and to private friends, but with no immediate prospect of interesting them in the subject so far as to obtain the necessary funds, and beginning at last to despair, had arranged to settle down at home. In August of 1870, a deputation or embassy to Natal arrived from Umzila, King of Gasa (who ruled all the country from the Umkomogazi, or King George's River, at Delagoa Bay, to the Zambezi), making certain political representations, and requesting the Natal Government to send one of their officers to confer with him. The Lieut.-Governor, Mr. Keate, asked me whether I would undertake the mission, to which I readily consented. He informed Umzila's embassy that they could return to their own country, and that I should be sent thither, as I had formerly travelled in the southern part of his country, and did not dread the local fevers, or the necessity of travelling on foot; and as I was the son of one of the higher officers of his Government, I was fit to represent them.

Events did not go so smoothly as I had anticipated; but after numerous disappointments and delays, the Government agreed to send the expedition. They provided for it, however, in such an economical manner, that I was obliged to obtain goods for the purpose on my own private credit.

I sailed in the schooner *Congune*, on the 25th of June, 1871, from Durban. Our party consisted of Mr. Dubois, as my interpreter; Matthew Umzondo, a native, as our Induna, or head man; Ekaté, a little Zulu boy, servant to Mr. Dubois; and Samuel, a Zulu man, who spoke English, and was my factotum.

All our coin amounted to but 6*s.* 6*d.*; but as goods and not money are currency in a Kafir country, we were as light of heart as in purse. Calms and contrary winds delayed us some time; but after the usual accidents and incidents of a sea-voyage, we sighted Inyak Island at the mouth of Delagoa Bay on the 29th June, and came to an anchorage within the harbour of Lorenzo Marques, called English River on the charts. Here the water was calm as a mill-pond, and 8 fathoms deep within 150 yards of the shore.

On the north side, or right hand, stands out a mile or two a bluff of red, rotten sandstone, covered with clumps of bush and grass, alternating with patches of bare red sand; the base being strewn with masses of rock. A little cottage is perched upon the brow of a low range of hills behind the town; this is the Governor's villa, whence very lately an inroad of the natives made him beat a rather hasty retreat.

Farther to the left, a few coco-nut trees and some reed fences protect what appears to be huts made of dead palm-leaves and grass, and of mixed character; these are the abodes of the slaves or half-castes. The next object is the *place d'armes,* a dilapidated old barrack exposed on the seaward side, though a few rotten poles, with frequent intervals between them, make it appear to have been once protected by a stockade. On the crumbling walls are a few rusty cannon (mere dummies) with a brass field-piece or two, having large wheels, and very incongruously mounted high up on the parapet. This noble defence is built, like all the rest of the town, of unhewn and shapeless pieces of the soft red sandstone, fixed into a mass of mortar. As each layer has to get dry before another is put on, in this system of construction, the building must have been a work of time. The mortar used is of good quality, and prepared from shell-lime. The builders are all slaves, and of the (so-called) Tonga race.

The next conspicuous building is the Custom House, which has some pretensions to architecture, and faces a square of loose sand, supposed to represent a market-place; for it is said in the ancient traditions of the town, that a pillar once stood in the middle of it, an indication to the Portuguese mind that a market may be held around its base. An untravelled Englishman's idea of a market implies a crowd of persons; that of a Cape or Natal colonist figures out a man mounted upon a sack of potatoes or onions, or a load of wheat, crying, "5*s.*, 5*s.*, going for 5*s.*, gone for 5*s.*," or some such like process. But a market in a Portuguese-East African, fever-stricken town, is a very different affair, and consists of a few negro women sitting, lying, or leaning on a basket or two; cigarettes made with banana-leaf outsides; cakes, like Kafir arm-rings; doubtful eggs and hungry fowls;

bananas, and a little grain. There are no cries, plenty of gossip, and no pressing to buy. A description of this market will suffice for all those in the other towns along this coast.

This square is flanked by some very respectable houses, generally whitewashed, and with a broad coloured margin like that of a mourning envelope round the doors and windows and the house itself. The tops are flat and the roofs invisible, being constructed of beams overlaid with wattle and daub, over that clay, and lastly mortar. They are thus so heavy, that all the beams are bent inwards by the weight of the superincumbent material.

The beams are cut out of mangrove poles with an adze; the doors and windows are constructed of a wood resembling mahogany, procured from a low deciduous tree, called "Umcheni" by the natives, which bears numerous pods containing large black seeds or beans, with a curious red, wax-like cap or eye in the end of each.

On one side of the market-place stands the Viceregal palace, distinguished from the rest only by its having a few loose panes in the upper part of the windows. I entered this noble edifice and presented my credentials and letters of introduction to his Excellency Major Loe e Limas, a dark gentleman in a shepherd's-plaid suit, who saw fit to refuse me his permission to allow the expedition to proceed into the interior. This put an end to my visits, and left me an opportunity of employing myself, until the vessel left for Inhambane, in exploring the town.

From the market-square two streets lead off westward, lined on either hand with substantially-built houses, whose rooms are large and airy. The floors are all cemented over with mortar; and the furniture is solid and plain, generally consisting of a square table of native wood, a settee or sofa, and some cane-bottomed chairs. There were no attempts at display or even at comfort; bare necessaries seemed to fulfil all their furnishing aspirations. These streets lead to the native quarter of the town, consisting of a confused mass of straw or palm-leaf huts, fenced in with tall reeds, and having a dangerously inflammable appearance.

As there never were any wheeled vehicles in the place, and the old slave-traders and house-builders never dreamt of living in Africa for aught but greed or necessity, they never conceived the possibility of European colonies springing up in their vicinity, nor that vigour and health could be sustained continuously in European constitutions.

The future of Delagoa Bay under the Portuguese rule can be but decay and death; but under a Teutonic race, a more

glorious future may await it. That it will fall under one or other of those races by force or diplomacy there can be little doubt. Europeans will not be ruled by half-castes, except of undoubted equality, which at all events those of Portuguese extraction are not.

This mass of grass huts, reed fences, decayed forts, rusty cannon, small proportion of Europeans, and large half-castes, Banyans, Mussulmans, Brahmins, Tongas, slaves, and freedmen, sand dunes, narrow streets, flat-roofed houses, and coco-nut trees and stench, is enclosed by a wall about 6 feet high, recently erected and protected by bastions at intervals, mounting heavy guns and showing a rifle tower or man-house on each; only a poor, but yet sufficient protection against the savages around.

The principal articles of export are orchilla-weed, gingelly seed, pistachio nuts, beeswax, hides, and a little ivory. Not one-fiftieth part of the trade that might be done exists.

Delagoa Bay is without doubt one of the most magnificent harbours to be found in Southern Africa, and shares with Inhambane this pre-eminence.

Some of the native boats are constructed on the European model, with lateen sails; but the most singular are the boats made by the natives on the Usutu, and which are brought down to Lorenzo Marques by river. They are sewn together throughout, and approach more or less the European model; as the planking permits, more or less straight or crooked. They have a flat stern and peaked prow, and leak considerably, despite a plentiful plugging of clay; yet the natives perform voyages of 100 miles in them by sea with safety. The oars are merely long poles, with a round piece tied on to represent the blade.

At one time the slave and ivory trade must have made this an important station; but the abolition of the former, and failure of the other by the retreat or death of the elephants, have reduced the place to a most miserable condition.

The Portuguese appear to have kept behind their walls, and had no knowledge of the elevated country behind them, now known as the South African Republic, which consists of hill and dale, and is elevated, healthy, good for sheep and horses, and even now grows wheat abundantly. On its eastern slope all tropical productions will thrive. Extensive tracts of it are as much as 6000 feet above the sea, and within less than 100 miles of their magnificent harbour. In other places an insalubrious seaport does not spoil the interior trade of more healthy regions, so that the fever and other drawbacks need not have confined their settlement to being a mere trading station.

As the Governor refused me permission to proceed to the interior, I landed my heavy goods; and Mr. Dubois went ashore with the intention of ascending the Umkomosi River, which is on the southern boundary of the Gosa country, and thus arriving in Umzila's territory, and procuring bearers to convey him towards the King's kraal.

The *Congune* sailed on the 8th of July for Inhambane; but the wind veered to an unfavourable quarter, therefore we were obliged to anchor off Shefin Island, which is situate at the mouth of the Umkomasi (or Umkomogazi) River, called St. George's on the charts. We were about 2 miles off shore; but were enabled to put off to the island, and found a good landing place. The island is low, and covered with scrubby bush on a ridge of blown sand facing the sea. We met with the "spoor" of small bucks, and were not long in seeing the animals themselves, and managed to kill one. It was the small red "bush buck," called *incumbe* by the natives, and which is common in Natal. On the other, that is, the river side of the island, the sand is considerably coloured and impregnated with vegetable matter. A native garden showed, from the reaped stalks, that the sand was fertile enough to grow cereals. There is only one family of natives on this island—placed there, it is said, by the Government to prevent the British from setting up a claim to it as an uninhabited place.

These natives procure water from a well, or rather hole, in the sand. The western side of the island is washed by the outflow from the river. The water is brown and discoloured, apparently by the ebbing and flowing of the tide.

A very picturesque little bay forms an expanse of smooth water, surrounded on every side by bushy land. Another small island is in the middle distance; the steep hills ranging one behind another along the course of the Umkomogazi break the monotony of the horizon. Over all hovers deadly fever.

On the 10th, the wind being still unfavourable, we persuaded the captain to put across to Inyak Island, on the southern entrance to the bay. This had some interest, as the British Government lays claim to it. On the faith of this, certain land speculators from the South African Republic had obtained permission from the Home Government to squat there, and use the Usutu (Mapoota) River as a means of approaching their lands, which lie between the 26th and 27th parallels of south latitude, and about 100 miles in the interior. This so alarmed the Portuguese, that they sent a guard of soldiers to occupy the island, and built on it a substantial barrack. On the Imperial authorities being appealed to, the troops were ordered off, and

the disputed possession submitted to the arbitration of the President of the French Republic.

We found the anchorage good, with 7 or 8 fathoms of water to the west of Elephant Island. A small piece of sand, connecting it with Inyak, was generally dry at low water, and helped to form a most commodious and safe harbour.

Water can be obtained from the centre of this small island, which will probably one day be a station for supplying large vessels. Those measuring 400 and 500 tons might perhaps seek an anchorage nearer to the main settlement. Between Elephant Island and Inyak there is a wide expanse of shoal water, with a flat rocky bottom of sandstone. The appearance of the island from this point is picturesque, and the land high and steep, with bluff-like promontories about 250 feet in height, covered with clumps of bush.

We landed on this island, and found it well inhabited by natives to the number of at least 1000, in about 250 huts. Water is procured from a sort of marsh in the centre, and though discoloured is palatable. At the southern end of the island there is a deep bay, mostly dry at low water, but which makes a pretty picture when full. Cape Collatto, a high ridge of white sand, with dark patches of bush, and a faint blue line across the bay like a cloud, are all that can be seen of the mainland. This island is said to be perfectly healthy, and altogether a very desirable habitation. It is within a day's sail of the mouth of the Limpopo. Should the British ultimately become its possessors, it would, no doubt, soon be well occupied. The soil is not sufficiently good for profitable farming, but would produce fruit and vegetables for a small town. The shores might be lined with coco-nut trees, which would bring in a handsome revenue, besides ornamenting the locality. Any other tropical productions would thrive luxuriantly. The whole available surface has evidently been at various times cleared and planted by the natives; who complain that now they can find no more virgin soil to till; but if ploughed up, it might perhaps be as good as ever. At one time it was a very favourite place for cattle; and, in fact, served the present King of the Tongas (so called) or, more properly, "King of Makasan," as a grazing ground. There are but few cattle there now, as the King has taken them nearer home; but they still do as well upon it as ever. The surface is about 15 square miles, or about 7 long by 2 broad; but it is irregular in shape.

On the 12th a fair wind sprang up, which soon freshened to a gale; and at 3 o'clock in the afternoon we passed the mouth of the Limpopo, Bembe, Miti, or Inhampura River.

We sailed about 5 o'clock in the morning, and reached

it, therefore, in about ten hours. The captain purposely stood as close to the shore as the gale would permit him; the sea appeared to be breaking heavily on the bar. The sailing-directions for this coast are extremely meagre; there are many conspicuous land-marks, which would be of great service to vessels visiting it for the first time, if they were inserted in the 'Pilot,' or other recognised authority. At last we sighted Barrow Hill on the southern entrance to Inhambane Bay, and passed it about 9 o'clock A.M.

The next morning, as the pilot did not put in an appearance, the captain made sail under directions of Mr. Beningfield, a passenger who had often visited the place before. There is a leading mark over the bar, and then the bay trends south-westerly. The pilot joined us at last. We passed slowly up the harbour; on our left some islands, covered with bush and coco-nuts, seemed to be the abode of flamingoes; one flock of which birds, as they took flight one after another, the captain estimated at two miles long. On the right hand there appeared to be a sort of river running down from the north, which I was told was the mouth of seven or eight small streams which keep open the entrance into the bay, as there are no others flowing into this harbour at the lower end. Were it not for these, the sea would soon bar the entrance with sand. Coco-nut trees bordered the right hand shore as far as the eye could reach, and then the view was bounded by the horizon; the bay being so long, that even at the town the end is only just visible; but it is only between 3 and 4 miles broad. The town makes itself known by a large church and a mosque prominent amongst its buildings. The bay is backed by comparatively lofty wooded hills. Between Point Zavora and Cape Corrientes we had passed the "Double Land" in the Chobi country, a bushy range backed by a higher one, respectively about 500 and 600 feet above the sea. North of Inhambane Bay there is also some lofty wooded land, and a rather conspicuous solitary hill at Cape Corrientes, which is about 800 feet high. The town is a considerable place built upon a hog-backed hill, which is almost surrounded by the sea at full tide. There are a number of European Portuguese in the place, who give a somewhat higher tone to society than what exists at Lorenzo Marques, where depravity pervades all classes. There is not a white female in either place.

The country to the west of Inhambane consists of a flat, sandy, bushy tract, until it reaches the Limpopo, a distance of 150 miles in a direct line, but it is badly watered, and quite incapable of being utilised for any purpose, except for India-rubber, bees'-wax, ivory, and an inferior kind of gum copal.

These are the natural productions, and are fast diminishing in quantity; yet Inhambane still exports a great deal more than Lorenzo Marques, though the latter has the trade of two navigable rivers, and is upon the edge of as fine and healthy a country as any in the world.

The reason why this anomaly exists may perhaps be because Inhambane possesses the rule over a tract of country north and south of the town about 70 miles long and 15 broad; whereas the Government at Lorenzo Marques can call nothing their own beyond the space within the range of their cannon.

The whole of this country seems to be retained now under Portuguese rule by the wisdom and justice of a single man, John Laforte, honorary colonel in the Portuguese Irregular Forces, who has armed his retainers, and keeps out the Zulu tribe under Umzila (son of Shoshongaan or Manukuza); thus enabling a peculiar tribe of people to the southward of the town, the Chobis or Mindongues, to maintain their independence. This part of Africa was formerly so overrun and oppressed by these Zulus that the conquered aboriginals preferred the Portuguese rule, and therefore fled into their territory for protection. Colonel Laforte has already taught Umzila to respect him; and has not only preserved the town many times from destruction, but has also defeated Umzila in all his encounters with the Portuguese or their allies. Besides this strip of country around Inhambane, the Portuguese do not possess an acre that they can call their own outside the walls of any of their stations south of the Zambesi.

The ancient inhabitants of the country around the bay call themselves Basigas, and boast of having once possessed cattle, though they have none now. They appear to have been a harmless and peaceable people of the Chobi race, and easily overcome by the Portuguese, who must have found conquest south of the Zambesi an easy matter when the country was entirely peopled by these industrious natives, called generally by the Zulus by the contemptuous title of Tongas; though having several separate nationalities, and speaking distinct languages.

Since the invasion of the Zulus, the Portuguese are neither feared nor respected. Having pure negroes for troops, they are held in the greatest contempt by the surrounding tribes.

Inhambane is environed by coco-nut palms, which also surround the bay. This fine sheet of water is 20 miles long and between 3 and 5 broad. Supposing that 170 trees can be planted on an acre, and that the belt is an acre wide all round the bay, or say for about 40 miles, there would be 1040 acres, and at least 177,000 coco-nut trees. A large amount of coir-

fibre and oil could be obtained from such a plantation; but the coir is only used for home consumption, and no oil is manufactured.

Some fine sugar-cane is grown near the mouth of the bay, and a little sugar manufactured by very primitive appliances. Agriculture is not practised by the civilised inhabitants. The free natives grow an immense quantity of ground nuts (*Arachis hypogæa*), which they sell readily to the French traders for about 4*s.* the hundredweight, when shelled. These are exported to France, and are there manufactured into a salad oil. Besides these, the natives grow a luscious fruit called "cazu," which they make into a fermented drink. They also use the sugar-cane for the same purpose, crushed in a rude kind of mill.

The water at Inhambane itself is drawn from a well, and is very bad; but good drinking-water can be procured from a spring in the neighbourhood.

We landed, and hired a cottage in the middle of the native quarter.

The abolition of the slave trade virtually deported the wealth and aristocracy of the population away out of these towns, but the evil influences and lazy disposition attending that traffic long kept them in a state of listlessness and poverty. The finer edifices are sometimes pulled down for the stone and timber to be used in building little hovels, indicating the degeneracy of the present inhabitants.

At length legitimate commerce has inaugurated a new era; and Inhambane is rapidly rising from degradation, and seeking its place in the world of free trade and progress. Already the French and others are engaged in building houses, and giving to the place an improving tendency. The streets, like those of all other Portuguese towns, are narrow and crooked, and naturally sandy.

I presented my credentials here, and was told that my dark friend, the Governor of Lorenzo Marques, had written to say that he had taken the responsibility of refusing me leave to proceed on my mission; and that therefore the Governor at Inhambane must not exercise his own prerogative in the matter. However, the latter told me that he would certify that I had presented my passport, which would enable me to travel anywhere within his district of Inhambane. He said that it extended a considerable distance, waving his hand around 180° of the horizon. The sea bounds it to the east. He added with a cynical smile, that if I went among the independent native states he would not be responsible for my safety. As this was all the permission I wanted, I made preparations for a start.

I started on Monday, the 31st July, and went about 6 miles

at a good foot pace, to a large kraal, where I stopped for the night. My party consisted of twelve porters (six of whom carried the pieces of my boat), my interpreter, and my servant Sam. This Tonga kraal will serve as a type of all the rest; and therefore I shall describe it in detail. The huts are not usually here built in a circle as they are by the Zulus, but in a long line, sometimes only on one side of a cleared space, and sometimes on both. In the centre of the space there is generally a shady tree—a tamarind or an umkooshlu, of which latter there are two kinds, a semi-deciduous and an evergreen. This umkooshlu bears a green pod, in which there are many red seeds with black ends. These the natives boil until a fat exudes, which in cooling assumes the consistency and appearance of soft, white wax; it has no smell, and is much valued by them for greasing their bodies, as the cold does not congeal it, or give them the scaly appearance that the hard fat of animals would. The tree is always very much gnarled and branched, and, though attaining a considerable size, could never be utilised as a timber producer.

The virgin forest is purposely kept untouched around the kraals; and creepers of all kinds form a verdant tapestry apparently impervious. Sometimes the trees are so trimmed, and the kraal so fenced by brushwood, that it is impenetrable, excepting by the gateway, the pathway up to which is cleared of bush, and kept scrupulously straight and wide for half a mile, so that everyone that approaches can be seen beforehand. This is a precaution against surprise. When any suspicious visitors are espied, the inmates escape into the bush, where it is impossible to follow them. Over a few yards of the path next the kraal, the creepers and bush usually form an arch, either purposely or accidentally; the effect is, on the whole, pleasing, though produced by simple causes. First, the clean and broad path, with the hot sun streaming down upon it, is a change from the crooked and often obstructed way hitherto traversed; and then the grateful coolness of the small piece of arcade covering the entrance introduces the visitor to the friendly shade of the "talk" tree with pleasurable feelings.

Altogether the Tongas are an improvable and improving race. They consider war to be an abnormal state of existence, to be avoided or terminated as soon as possible; differently from the more savage Zulu, who regards it as the only fitting state of life, and despises the arts of peace.

Whether the Tongas are Chobis, Basiga, Bila-Kulu, Mandanda, or Mandowa, or whether they are under Zulu oppression or Portuguese protection, they are one and all industrious and

capable of improvement; possessing great agricultural abilities, and many rude attempts at manufactures.

Objecting to military discipline, and preferring to be governed by petty chiefs, whom they obey more from moral influence than from force, few tribes would probably be more susceptible of the religious instructions of missionaries.

The native huts are constructed with walls about 4 feet high, usually made of stout poles driven in side by side, and strengthened with rings of lianas, or withes, round the top to prevent them from spreading outwards. The roof is constructed upon the ground first of all, with reeds or sticks, radiating from a centre, and others added and secured by rings as it grows larger; it is then raised on to the circle of stakes forming the wall. The next process is thatching, which is performed in a similar manner to that practised at Inhambane. The upright portion is then daubed with mud, and the floor smoothed and smeared with cow-dung, where that is possible, which is only in a very few localities. The hut is then complete; the palace of the local Zulu king and the hut of the meanest Tonga are alike; they are a great improvement on the grass, bee-hive shaped huts of the true Zulus and the Natal Kafirs.

Early next morning I left this kraal, and passed over a very densely wooded and undulating country, with many ancient clearings and much present cultivation. A thick mist overhung the landscape, and the herbage was dripping with dew. The cackling of francolins, the piping of guinea-fowls, and the chirping of partridges, with many weird sounds of strange birds and the singing of others were heard on all sides. In every native clearing the passenger is startled by the "whirr" of partridges or francolins, or of the heavier guinea-fowls, as they rise from under foot.

About ten o'clock I reached the kraal of a principal man, and was entertained for the first time by the really effective music of these Basigas. Four or five native pianos, or rather harmoniums, were produced, and several drums, large and small, with rattles containing the seeds of the Kaffir boom enclosed in reed cases; also other calabash rattles fixed on handles, and a peculiar kind fastened above the calf and ankle of the right leg. The pianos started the tune, which formed a sort of accompaniment to the singing or air; the little drums had their own part and the big drums theirs; the rattlers of one sort and the leg-rattles also took separate parts. Instruments of one kind were played in conjunction with each other, each in their turns, and at intervals, as it was deemed necessary; a clash of the whole came in a chorus together. The effect was good, and the music very regular. At times it died away almost to silence, and

then gradually grew louder as each instrument chimed in, till the big drums, hand-rattles, leg-rattles, bass voices and chorus came to the final *crescendo*, and then as gradually died away again. I never heard the native music again so effective, partly because on our return the men were absent on a warlike expedition. After being thus entertained, I presented the head man with some beads and went on. We still passed through the bush, and excepting on occasional rises of the land, seldom caught a view ahead. At last I reached apparently the top of a low ridge, and found a native kraal, where we decided to stop.

I endeavoured to get an observation for variation of the compass here by the amplitude, as the country is so extremely flat that the horizon seems almost as level and well-defined as at sea. It gave 21° w. The instrument I had was a new "multum in parvo" sort of compass and whatnot of Casella's, sent to me by the Royal Geographical Society, and was not so efficient as an ordinary prismatic compass would have been; but as I could buy no instruments in Natal, I had to trust to it entirely; and having also lost my pocket compass, it had to do double duty for route and azimuth.

August 2nd, 1871.—Eight o'clock saw us on our road to-day. We skirted along the rises bordering the Inyanombi, and at one place made quite a considerable ascent. Unfortunately my barometric readings have been lost with my journals.

This elevation commanded a fine view of the country to the south and east, which seemed more undulating than to the west, and in fact quite hilly. The isolated conical hill at Cape Corrientes was a good landmark in the view. We evidently now began to approach the Inyanombi; for a high and continuous ridge extended on the right hand, under which that river seemed to flow. Our path skirted a similar rise on the nearer side, and crossed a marshy stream, in which there was a considerable depth of water. We arrived at about 11 o'clock at the Inyantamini stream, an affluent of the Inyanombi, and which forms Umzila's boundary. Shortly after, we crossed the Inyanombi itself, flowing from left to right, or northerly.

Here I took a meridian altitude, and determined the latitude to be 23° 57′ s., the kraal being that of Maranjin, brother of Mahonti or Makwakwa. The whole valley of the Inyanombi appears to be fertile and well worth cultivation, though the soil is red and sandy.

We now descended to a lower level, from which the sea had apparently not long (in a geological sense) retired. Many of the higher parts consist of a white sandy soil covered with bush, and others are open grassy plains. In these sandy wastes no

large game is found, and even birds are scarce. In some of the more open spots where there is water to drink, brindled gnus and zebras, as well as impalas, seem to be plentiful. Occasionally indistinct traces of elephants are seen, and ostriches are said to be found here occasionally. The scenery was, on the whole, monotonous, as the country is not well peopled, and the sandy soil adds to the feeling of weariness. The bush often completely confines the view to some 20 or 30 yards; and when an unusually high rise in the land gives a prospect ahead, nothing but a level horizon greets the eye, with an expanse of bush that seems to extend indefinitely on all sides. It will be needless to describe these features of the country over and over again, and the whole of it from Inhambane to the Limpopo is of the same character. Such elevations as exist are parallel to the coast, and are mere undulations of the ground, having been evidently formed originally on a sea-beach or desert tract by the action of the wind, sometimes out of pure sea-sand, and at other times from arenaceous soil of a red and more fertile description. They are universally covered by deciduous thornless trees, without any undergrowth, and with but little grass, and that of a poor sort. Patches of the vegetable ivory palm, of a stunted description, are to be met with, and occasionally one of the desiccated lagoons is completely filled by them, to the exclusion of all other vegetation. These trees seem to prefer a damp situation, but do not affect the black alluvial soil of some of these ancient lagoons. Where these prevail, they are found along those margins where the soil partakes partly of the character of the arid rises, and partly of that of the more fertile flats.

Soon after starting on the 3rd August, we came to the Eshigibi stream, having arenaceous limestone in its bed. This rivulet seemed to flow from left to right, and rounding a sandy ridge, disappeared in a very large open flat, whence it had no visible outlet. The water had no perceptible motion, but appeared to be clear and good. The natives said that it did not run beyond the flat, but the noble savage is apt to enunciate some very curious geography at times. We crossed it, however, and then skirted along the marshy open flat, making a somewhat southerly deviation from our usual south-westerly course. Across the flat to the south there appeared a white bare sandy ridge. On reaching it, the sand just at the bottom of the rise exactly resembled those minor ridges beneath the higher ones which are so often seen along this coast, and are quite dry. It seemed therefore that the stream must flow westerly to some outfall that I should ultimately have to cross; but on the return route it was discovered that my native informants were quite correct, and that the centre of this flat contained

some brackish pools of water which received the stream and had no outlets.

On the western side of this flat is an outcrop of arenaceous limestone; from its size and peculiar form it is well known to the natives, and is a conspicuous feature in the scene. It gives its name to the district of "Myatsaki." It is nearly round, and about 7 miles in diameter. There was fearfully hot work required to get over this glistening waste under an almost vertical sun in a cloudless sky.

The country here is very thinly populated, as it is subject to inroads from the Chobis or Portuguese natives whenever they are at war with Umzila.

This part of the country is inhabited by the Makwakwa, a powerful Tonga tribe overcome by Manukuza (or Shoshongaan), Umzila's father. They are at present under Mahonti, "the Makwakwa," but a faction seems to have split off and put themselves under Mabingwan, whose country will be described further on.

Beyond this flat is a tract of more than usually loose sand, over which an hour's walk brought me to the edge of another large marshy plain stretching away interminably to the south and east. I found only one miserable kraal there; but farther on there was a woman planting sweet potatoes in the rich alluvial soil, of which the whole flat is composed, and which terminated abruptly at the edge of the sand on the rise. This is the district of Inyansuna, which is named from this extensive piece of open ground.

Several interesting spots in this locality require further investigation, more especially the mouth of the Imbababa or Zavora River, and in another part of the country, the mountainous region between Umzila's and the Zambesi, including as it does the auriferous River Manica.

On these ridges the long pendant lichens hang down from the branches, and sometimes sweep on the ground. The soil now had a red and sandy character on the higher parts, and thither the natives seem mostly to resort, as the ground is sufficiently good for their purposes, and at the same time out of the general line of travel.

These natives seem to have a great objection to be near the water. Often their kraals are 3 miles away from any. They invariably have small clearings distributed through different parts of the bush, at long distances from their huts. These circumstances show the insecurity of life and property. Passing armies naturally seek the water, and therefore its immediate neighbourhood is bad for even the friends of these marauders. In case of surprise, the natives seek the bush, and trust to the

invaders' want of knowledge of their country for the saving of their corn. The native gardens, when first cleared, present a curious appearance. The smaller bushes and branches are cut down and laid around the roots of the trees; when this brushwood is dry it is fired, and the larger trees are killed. Felling trees is a work of some time with native tools, and is not undertaken. The crops are then planted amongst the dead trees. When the trees are sufficiently dry they are burnt down, and the white ants do the rest of the clearing in a few years. As in other countries, the same trees seldom spring up at first after these gardens (as they are called in Africa) are abandoned, though Umbinto woods are less easily destroyed than others.

Generally the country may be described as consisting of monotonous flats and slight rises covered with sand and bush, but yet affording new and changing scenes.

I tasted now for the first time of "buchem," the fermented drink made from the juice of the vegetable ivory palm called "lala" by the natives. In extracting this juice the natives first prepare a number of gourds, generally the shell of a species of *nux vomica*, called "Umkwakwa," but often those of the baobab fruit. Then they make a sort of conical cap of plaited palm-leaves, and sallying forth to their grounds, cut the leaves and young stems from the stalk, and sharpen the latter to a point. They then make a channel in the wood; stick in a little bit of the stiff leaf as a sort of spout for the juice to drip off by; hang the gourds over the head like a necklace, and cover the top with the conical cap. Men going solemnly about amongst trees thus prepared, moving a cap here and a cap there, seem like tree-worshippers who have dressed up their gods in this manner; but they are merely thus preparing a cool and palatable drink, resembling newly-made ginger beer. When in the proper state of fermentation it has the same biting taste as champagne.

August 4th.—Next morning early I crossed the Umkelingi River, near the kraal last named, and found the water about waist deep, with a clear and rapid current. There was some half-formed limestone in its bed. The native told me that his father was the chief of the district near its mouth, and that this river fell into the Eshicomi, that into the Utsharu, that into the U'Kweleli, and that again into the Imbababa, or in other words, that this river went by those different names at different parts of its course. This is the river marked by a dotted line on some maps, and called U'Luize, a name which none of the natives near the coast know at all. I particularly inquired for its name at the mouth, which the man said was Imbababa.

He further informed me that it was never dry there, but that at low tide, just where it went into the sea, it was fordable waist deep. This is so far of importance that it would give at high tide about 13 feet of water. Inside the debouchure he described it as wide and deep. This river is marked on maritime charts as the Zavora or Oro.

The land traversed by this river has quite a bold appearance; wooded bluffs obstructing the distant view to the east. A bathe in the stream was a great luxury; for except the Eshigibi and the Inyanombi, there is not another deep enough for the purpose between this and Inhambane. The country now began to change slightly; the hills becoming more defined, and the woods of larger growth. Open spots more frequently occurred, and water was found in ponds.

We passed through some densely wooded country, and made a slight descent to a regular camping ground under a large tree, where bones of the buffalo and other game clearly marked this as a favourite hunting spot. Water was found in a spring.

We then came upon some very extensive open flats, traversed in many places by the broad paths of hippopotami. In a pool were some ducks; but the water was over a man's depth, and too wide to get at the ducks in it.

About a mile further on we bivouacked for the night. Seeing some impalas (or pallahs) I stalked them, and got a good running shot at about twenty paces, but missed. The report startled a large herd of gnus (blue wildebeeste). They did not go far before their curiosity made them stop. I stalked them sufficiently near for a rifle shot; but having only a smooth bore, I was obliged to expose myself to get nearer across the open space, and they galloped off. The ground around the pond was quite bare with the tread of antelopes.

In the morning, a mile or two on our road, we came to a large marshy tract extending as far as could be seen. This was the bed of the Inyabulungu River, apparently joined here by a smaller stream on our side. Having been carried across the smaller stream, I skirted the larger one for some little distance, and found the path to lead through the reeds. The river contained nearly 100 yards of deepish water, the reeds growing out of it. I was as much surprised at the sight and size of this stream as I was at the body of water and swiftness of the current of the Umkelingi, a river not marked on the maps. Altogether I discovered on this trip about thirty considerable rivers or main drainages not yet found on any map, besides rivulets and subsidiary streams. The Inyabulungu is said to join the Umkelingi, and, as I afterwards only crossed one river lower down, this must be correct. Doubtless the

hippopotami here find deep enough holes amongst the reeds in which to wallow. The place apparently abounds with them, as their paths cross and recross each other in every direction.

After crossing the river, the path again entered the white sandy country. We passed many water-holes, some of which evidently had a perennial supply, as the water-lilies completely covered them.

Soon after starting next morning we came upon the Inyampalimpali, or Inyampalipali (sable antelope) River, a strong and rapid stream, about 30 feet wide.

How all these strong rivers rise so far in the interior, as I afterwards discovered they do, and that in a mountainless, flat, sandy country, is not at all clear. Though all the streams I crossed in my homeward journey a year afterwards were periodical, there can be no doubt they ultimately lead to these perennial streams. To which particular river these three streams go, I do not know, nor even which is the one called the U'Luize River. I believe the Umkelingi to be the principal one, as the natives at the sources mention the U'Luize River, though those nearer the coast do not know it by that name. Any traveller in these regions will do good service to geographical science by tracing the course of these streams between my two routes. Señhors Santa Anna de Rita Montanha and A. Texeira in 1856, while travelling from Inhambane to Zoutpansberg, crossed the U'Luize. The natives describe its bed as consisting of open marshy country with pools and grass here and there, and quantities of game, including giraffes and ostriches, in the higher parts of it.

On the ninth day I found myself at Umvuma's, at a place called Simini. It was only about 2 o'clock; but the kraal was large, and some fine evergreen trees (Umkooshlu) spread an inviting shade; so I determined to remain. These people were genuine Tongas, and seemed delighted to see me. The old chief was very chatty and communicative, and as he spoke Zulu, we got on well enough.

Soon after starting from this kraal we crossed a large open grassy flat with pools of water. After this we got no more water throughout the day's journey, which was a very long one. Toward the latter end of it we entered a very dense and heavy forest, altogether different from any hitherto met with; so thick, indeed, that I imagined there must be water near, but the natives said there was not. Here I saw the first "tsetse" fly on this journey, and the black-crested guinea-fowls, which I had never before seen.

Next day we had quite a pleasant walk through a thickly inhabited country.

I soon came to the brow of the rises that impend over the valley of the Limpopo, and had an extensive view spread out below. A faint blue line of low hills, on the other side of the valley (which lay beneath me as level as a bowling green), showed its breadth to be about 20 miles. To the left a gorge was evidently the channel of a stream running down to some large pools of water and masses of reeds that appeared to trend away to the south. Seeing such extensive sheets of water, I imagined that the river had overflowed its banks, but ascertained that this was the Shohozoli River, which emptied itself into the Limpopo above Sidudu's kraal, and which I remembered crossing at its confluence in 1868. The bellowing, or rather hoarse barking of hippopotami, was constantly heard. The base of the rise seemed to be bordered by marshy ground and pools of water.

As I stood there the valley seemed to be completely filled with native kraals, and here I saw the first cattle I had seen in the country. I did not think any Kafir country could be so thickly inhabited as this valley; though I have seen Natal of course, and the Zulu, and Amaswazi countries. It was densely inhabited when I was here in 1868; but it seemed never to have been filled up to a much greater extent. The rises on each side are sandy, and covered with bush. The valley is open, and covered with grass and cultivation. Descending to the plain I found the ridge, by the barometer, to be about 250 feet above the plain.

Skirting the marshy ground that lay between the foot of the hills and the alluvial deposit beyond, a few miles brought us to a deep and apparently stagnant stream. This is the Umsaguti, or Shengane River, which I had crossed at its confluence with the Limpopo in 1868. It is about 60 feet wide, and too deep to ford.

We reached Manjobo's at 9 o'clock on the 11th of August. Manjobo is the Commander-in-chief of the Biyin. He is of the Intshi-Intshi clan.

I sent to say that "Maskiu" had arrived for the second time, and that I should like to see him soon. He came that night, but did not speak to me till next day. I told him the purpose for which I had come, and that Mr. Dubois and the goods had gone up the Umkomogazi with the intention of coming here, and asked if he had heard anything of them. He said he knew nothing of my mission or of Mr. Dubois. I was rather astonished at this, as we had been directed to come to his kraal to obtain bearers from him for the goods. I had noticed along the road that none of Umzila's people had received any intimation of the expected arrival of a mission of

white people from Natal; but I conceived that the great man of the Biyin (as this country is called) would know all about it when I got there.

He admitted next day that he did know about the expedition, but that it was not sent through him; that he had nothing to do with it; and that if it was true that Umzila wanted to make friends with the white men, he did not.

15*th.*—I left to-day, crossing the river in a dug-out canoe, though I had forded it here on my previous visit.

We found plenty of inhabitants on the south bank, and struck across the bare grassy alluvial plain in a south-westerly direction. After going about 3 miles we found ourselves again near the bank of the river, at a new kraal which Manjobo is building there. Here, much against my will, I was obliged to wait patiently until the guides chose to come on.

Getting on the way again, we found the country more thinly peopled, and after about 4 miles more we crossed the Munuwane (salt) River, a semi-stagnant stream which, just at this point, could be crossed by a good running jump, but higher up and lower down spreads out into ponds and lakes. We now began to enter a country marked by low rises bordering the river, and found it poor and sandy, and covered with bush. The sand is sometimes apparently yet unreclaimed from the native barrenness of its marine origin, but is generally covered with open woods. Sometimes the Umcheni, the largest tree (except the baobab) in this part of the country, spreads its wide naked arms on high, and relieves the somewhat monotonous character of these shimmering sand-covered tracts. In one or two spots the bush presented quite a primeval character with its festooned lianas and damp shade. The Umcheni is deciduous, and has shining green leaves about the size of a crown-piece; it bears a large pod containing black seeds, about an inch long, each seed being capped with a red, wax-like artificial-looking end. The wood is used by the Portuguese for timber, and bears a very great resemblance to mahogany in colour, but the texture is slightly closer, and the wood altogether rather harder. The trunk does not present a very favourable block from its want of length and straightness, but suffices for the small demand for home consumption in the miserable Portuguese villages on the coast. It is an extremely handsome and lasting wood for cabinet purposes. The bark is suitable for canoes, as in fact are several others in this country, which is not the case elsewhere in Africa.

Next morning, after about two hours' walk, being attracted by some dogs barking on the other side of a swampy piece of

ground, we crossed to some kraals and found the first instalment of the goods there.

The loads continued coming into this kraal one at a time, some on women's heads; and on inquiry I found that they had come about three hours' walk from Massia's Kraal that day. My Induna, Matthew Umzondo, arrived at last, and gave me a history of the events that had happened since I had left Delagoa Bay, which was further added to by my companion Mr. Dubois on his arrival that evening.

Mr. Dubois informed me that he had never experienced so much difficulty and annoyance in his life as he had in getting the goods along on this journey.

He left Lorenzo Marques on the 8th of July in a launch (a boat of native construction) to go by water up the Umkomogazi (King George's River) to Silinda. He arrived there on the 12th. He sent a message to Umzimgulu, who used to live where Umyangu lives now, on the eastern bank of the river.

This Umzimgulu was the envoy that had been sent to Natal, and was to have taken charge of us on our arrival. A week afterwards he received an answer saying that Umzimgulu had gone to Umzila's place, but that his brother Umgishan would come to Mr. Dubois in a day or two.

He arrived on the 23rd, and canoes were produced on the 28th to convey the party up the river. The goods were landed near Umyangu's. It took the bearers three days to convey them through a bad swamp about 3 miles wide. On the 3rd of August he was enabled to make a start thence.

The system of carriage adopted being by levies of bearers (women included) from kraal to kraal, the longest day's journey thus made never exceeded four hours' walk; and oftener one hour's, or one and a half hour's walk only was accomplished. At this rate he completed the journey to Matamini's in fourteen days from Umyangu's, and forty-one from Lorenzo Marques; the whole of the goods not arriving until the next day after I got there.

The day they started from Lorenzo Marques they only made Shefin Island, and landed there.

The next day they attempted to get up the river; but as the wind was too strong, they were obliged to stop another day.

About 9 o'clock on the 10th they got off, but had to tack about to get up against the wind, and entered the actual mouth of the Umkomogazi at 2.30 P.M. They landed at 4 o'clock, as the water was too shallow for even this boat to get up. They proceeded again until 8 o'clock, and found the river deeper when once inside. They spent the night on Little

Shefin Island, about 5 miles up the river. Next day they made very little way; but on the 12th they passed several small islands. Lemon-trees were growing on the banks, and they procured a large sack full of the fruit.

At 2 o'clock they passed the last Banyan (East Indian Portuguese) station on the river. At 3 o'clock they passed the mouth of a creek from the north called Hlabawaan, and arrived at Guhlewaan, a kraal of the chief of Silinda, on the south bank, at 5 o'clock P.M. It is built on a sand hill called Umhoonweni. On the 13th they sent the boat back. On the 21st Mr. Dubois had a visit from the chief Matshi-Inkomo (beef-eater). Mr. Dubois then discovered that he should have gone 15 miles higher up the river, but that the natives had intimidated the boatmen, and made them stop here in hopes of extorting something from him. In this they were disappointed, since he was not to be frightened into giving, as would have been the case with a Portuguese.

On the 25th some of the native dug-out canoes arrived to convey him up the river. They are smaller and longer than those usually found on these rivers, and are consequently much more manageable affairs. Two men paddle them, one in the bow and one in the stern. They use long paddles shaped like marrow-spoons.

On the 28th he started again, but preferred walking along the river bank. He found many marshy streams, and other spots almost impassable. Here he saw many "mali palms," like gigantic date palms, but of quite a different family,—very handsome and umbrageous, and branching out from near the ground to a great height. This part is called the Silinda district. Next day he imagined he should cross the river to the destination of yesterday's boat cargoes; but found that a large island obstructed the passage. He had therefore to descend the river again in a canoe for an hour, and then ascend the other channel for two and a half hours to Umyangu's. After landing he passed through a deep marshy tract bordering the river for 3 miles. It was mostly up to his armpits. He estimated that the sea was only about 8 miles distant to the east, though he was about 50 miles from the mouth of the river. On the 3rd of August they started again, passing along the eastern edge of a large reedy and marshy flat, with pools of water, until they arrived at Maahela's, where they stopped. Next day, pursuing a north-easterly course, they crossed two swampy streams flowing to the west. This was the Showa tribe's country.

On the 5th, whilst out shooting, he crossed one branch of the Umkomogazi again (which is here not more than 25 yards

wide at the utmost, but deep) on to an island which he found to be covered with large ponds having hippopotami in them. He describes the natives as growing plenty of sugar-cane, of the variety called "China" in Natal. Next day they crossed two marshy streams flowing westward, and the next day four more.

On the 8th he crossed five streams flowing as usual to the left, or away from the sea. This part of the country, or Inhlangwanyan's district, he describes as being the best he had seen; it is open, grassy, and park-like.

On the 12th he passed two more streams, crossing as usual on fallen trees as the bottoms were not firm. They flowed westwards.

The whole of this part of the country was covered with bush, sometimes very dense, but mostly more open.

On the 16th we met, and his proceedings now merged in mine for many, many weary months to come. His ideas with regard to the Umkomogazi, or King George's River are, that though the mouth is only deep enough to admit boats, the channel itself is deep. It never exceeds 100 yards across, and is not 600 as stated by Captain Elton. The navigable part extends for about 70 miles, but at the greatest distance is only a few miles from the sea, as it runs parallel with the coast line from the north after the main stream (which rises near Lydenburg) has burst through the Bomba Mountains. The main affluents of this river are the Sabilala, the most northerly; upon the upper waters of which gold is now being found. It joins the parent stream below the Bomba Mountains, that is, on the eastern side of them. The next is the Umgwenia, which joins the main stream just at the passage through the mountains, and the last is the Umkomasi, which falls in above the Bomba on the west side. All these tributaries, and the river itself, rise in the neighbourhood of Lydenburg, at an altitude of between 5500 and 6000 feet above the sea, and in one of the finest and healthiest countries in the world. The coast lands, drained by this river, are fertile enough, but the climate is too unhealthy for European colonisation. Except for depôts of goods and produce *in transitu*, or perhaps for sugar and other tropical produce, they will never be valuable.

The day before we met Mr. Dubois, he had been joined by Dabulu, the second in command of the Natal Embassy, who had just come straight from Umzila with orders to bring us up to his kraal, and to levy bearers. Our complaints of this system of carriage were loud and deep, but he said it would be all right when we got to Manjobo's kraal. It was not until the third day after the baggage had arrived that we were enabled to

make a start. And then the bearers threw down the loads at the next petty chief's place, about 3 miles on.

We were enabled to make a further distance of 7 miles that day, but left several of the loads behind for want of bearers.

The succeeding day we were only able to cross from one rise to another, through a swamp, to the kraal of Madolo. This was a large one, with a capital old chief, who killed two goats for us.

On the 21st of August we were enabled to reach the Limpopo again, after what would have been two hours' walk if the bearers had gone all the way. We struck it about 4 miles higher up than where I had crossed on the downward journey. Skirting along its banks for about an hour-and-a-half, brought us opposite to Manjobo's. We noticed many spots in the river, even in this 5 miles' stretch, where the sand-bars would make it quite impossible to take a row-boat over them. Here, as elsewhere in this account, I can give an unqualified contradiction to Captain Elton's statement that the river is navigable "even at this, the dry season of the year," though I will do him the justice to say that he never saw the lower part of the river; his accounts refer to it higher up.

Arriving opposite Manjobo's, I determined to put my knowledge of the river to the test, and therefore ostensibly had a bathe, but privately determined to ford it. I then waded right across the river to the other side, and found it up to my ribs in the deepest place. The river was so altered since I was last here in 1868 that I should not have known it. Then it flowed in one clear stream between the sandy beaches on each side; now it was divided into three streams by low islands, the strongest being close to the left bank; but the main body of water passed near to the right bank, where it had cut quite a deep channel for itself out of the drift sand. The alluvial soil of the precipitous banks that apparently confine the river in summer were now some distance from the water on that side. Above Manjobo's there is a fine stretch of deep water, about 2 miles long and 400 yards wide, though just at the crossing the stream is confined to about 50 yards, and about 4 feet deep. A little below this it shoals to about 3 feet in a very narrow channel. The latitude of Manjobo's being 24° 41′ s., and the mouth of the river 25° 12′ s., the whole difference of latitude is 31 miles. As the difference in longitude is not more than 5 miles east, the whole distance in a direct line is 32 miles, so that there is not much margin for navigable water here.

The loads came in by driblets until the 24th, when my Induna arrived with the last. It was quite useless for me to wait until all the goods were forwarded on ahead, so that we

adopted the plan of getting together as many bearers as possible, and going with the first loads, at the same time leaving a message that we should not wait for the goods, but hurry on to the King and inform him that they would not carry his things.

Having now been recognised in my proper official position by the King's messenger, I told Manjobo that I expected to be made welcome to the country.

Several changes had taken place since 1868. At that time wood was as scarce near the river as it is now; but now there was a tolerable display of thorn trees near to the kraal, which I remembered noticing when they were growing in 1868. They were then five or six feet high, but now they were considerably larger. The country also seemed to be more traversed in all directions by paths, and cattle were to be found at every kraal on the left side of the river; whereas formerly there were but few domestic animals of any kind. The valley was, in 1868, almost uninhabited below Sidudu's, and even in the more thickly peopled parts cattle were scarce. Now the kraals were thickly dotted over the plains, and cattle were seen at every one of them.

We spent the time, until the month of September, in making up the canvas covering for the double canoe I had brought, and oiling it, making the sail, and so forth. During this time we also made inquiries as to our route, and the nature of the country we should have to pass through; and we then first heard that the country from the Limpopo to the Zambesi, due north from here, was one immense bush-covered plain, without mountains or even hills.

Being informed that there was some game in the neighbourhood, we went for a day's sport, but after walking a long distance to the north-west, and crossing a large pond, we saw only a few quaggas, and returned. We found the country here to consist of large, open, and once marshy spaces, but now quite dried up.

To the north was a considerable elevation, which the natives informed us was on the left bank of the Saguti River. Returning by a more easterly route, we came upon some brackish ponds, which evidently drained into the Saguti. To the left there was a very much larger one, where many water-fowl and waders of all kinds were disporting.

The soil throughout was of a very superior kind, and totally untilled and unoccupied by the natives, who seem to have preferred the river valley nearer the coast.

Following a well-beaten path, we unconsciously found our way to "Umkontwain," the Royal Military Kraal of Biyin. It was a very pretentious place. The cattle kraal was a very

creditable construction, built of thick, straight poles, driven into the ground, and crossing each other diagonally, like a number of the letter X placed side by side, and forming such a dense stockade that the cattle could not be seen inside. There was probably room in it for one or two thousand head, but it does not usually contain more than a hundred. There were not many huts there, as it had been only lately erected; but we were informed that it was intended to vie with Panda's royal residence, "Nudwengu," in the Zulu country, in which the huts are said to be six rows deep.

We were hospitably received, and asked into the great hut, to be entertained with beer, or *tyuala*, as it is generally called, which is a fermented decoction of the meal of the red *Holcus Sorghum*, or "Mabele." The hut had a floor polished like black marble, and nearly as hard. As usual with the Zulu section of the inhabitants, the door was made so low and small that one could barely get in easily on hands and knees, and when once inside nothing could be seen for some moments, until the pupil of the eye accommodated itself to the gloom. After our entertainment, we returned through open scrub, over red soil, and among euphorbias. We noticed quantities of a peculiar and beautiful pink flowering plant, very plentiful in this country, but with which botanical books are not yet familiar. The natives call it "Shimormyan," or the little baobab, and it certainly sometimes bears the same peculiar appearance that some of those gouty-looking stems do when seen in their winter nakedness; but instead of putting off its holiday attire at that season, as the baobab does, it wears a gorgeous livery of pink flowers, very much resembling the rhododendron, but brighter in the contrast of the red ribs of the petals, with the pale pink ground. They are quite leafless at all seasons; and when not in flower, are bare, dead, plethoric-looking things, growing up in a meaningless sort of way, from their bulbous roots. In favourable, sandy situations they attain to a height of about 7 feet, but usually they are about 3 feet high. The natives say that every part of them is very poisonous. They are pretty freely distributed over the whole region of the Umhlenga country and Limpopo, even to near Lydenburg. They are also found in stony spots as far south as the Pongola, in Zulu Land. Seed vessels are sometimes found upon them, shaped like an elongated military frog-baton, and of a dark purple-red colour.

Fish are plentiful in the Limpopo. Doubtless a naturalist furnished with proper nets could find sufficient objects in the undescribed and unknown inhabitants of the waters of the Lower Limpopo to form material for a good-sized volume. The river teems with aquatic birds.

We started from Manjobo's place on the 4th of September to go to the sea, which we expected to reach on the following day. We found the river so shallow, and the channels so tortuous, that we could not avoid running aground once or twice in rounding sharp corners, though our craft drew only a few inches of water. Sometimes a stretch of deep water afforded a little fair sailing; but the north and north-west winds, being only morning breezes, died away about 10 o'clock, and were followed by a calm. We then took to the oars, and found rowing to be harder work than we had expected. About 2 o'clock the sea-breeze began to spring up, and was usually adverse.

When in some bends of the river with the wind a-beam, we made good way, but in others we were delayed, and in one or two places there was not more than 2 feet of water. During the first day's journey the river was obstructed by sandbanks, often very crooked and altogether unnavigable at this season. The second day's voyage presented but little change. Sometimes hippopotami and crocodiles were met with and fired at; many water-birds and waders were seen. The natives were extremely astonished to see a boat impelled by a sail. They followed us for miles along the banks in dense crowds. Mr. Dubois interpreted many of their exclamations of surprise, such as, "There go the fathers of ships!" "There go ducks!" "There go fish!" "There go birds that sail on the waters!" "There go the children of the sea!" In the afternoon we passed the confluence of the Shohozoli and Shengane, or Saguti rivers. Towards the afternoon of the seventh, we crossed the limit of the tidal rise, which also limits the navigability of the river, and soon afterwards passed "Sidudu's" reach and island. Under the western bank of the river, and between it and the island, there are 7 feet of water, though the channel is not more than 300 feet across. After this there are 2 fathoms and upwards.

About 4 o'clock we put up at Inyama's kraal on the west bank, about 2 miles directly south of Sidudu's. Here I caught some fine *silurus*, or "barber," as they are called in Natal. The banks were now muddy and the water discoloured. The river was, however, a fine open sheet of water, extending 300 yards across from bank to bank, and from the swell that the wind got up, evidently continuing the same to the sea.

The next day, taking advantage of the morning breeze, we made good progress, but found the river extremely tortuous. The natives still continued to follow us, expressing their astonishment in their very original manner. It was evident that they had never seen a sailing vessel on that river before. The lead showed from 2 to 4 fathoms during the day.

Sixth day.—The soundings were 4, 5, and 6 fathoms, and

after this they varied between 5 and 6 to the sea. We saw some hippopotami, and thought that we had killed one, but did not get it. It ultimately died, and afforded the natives a feast.

The banks now began to show very evident signs of tidal action—sometimes by large stretches of fine mud left at low-water. The day was intensely hot, and during the middle part of it the usual calm occurred. We began to get very thirsty at last, when one of the "children of nature" kindly bethought himself of matubu, or Kafir beer, or rather, small beer. He paddled off in a dug-out canoe, and gave us a calabash full. This revived us until we got to a reach in the river that enabled the sail to be used, a grateful relief.

At last we reached Sivungatana's place, where I swam the river in 1868, and then a southerly stretch extended to Intshi-Intshi. Rowing down this against the wind took us a couple of hours. We arrived there at last just as the land party were crossing the river. This was the best day's voyage that had been made—altogether about 18 miles.

Intshi-Intshi in 1868 was uninhabited, but now we found the young chief—the Intshi-Intshi—at his kraal, where he had four or five cows. I asked him where all the people were in 1868. He said that all these people on the lower course of the river had fled into the Chobi country during the civil wars between Mawerwe and Umzila. Such cattle as they could get away they took with them, but, he said, they could not get them back again. The Chobis claimed nearly all. He had been eight or nine years living as a refugee. He averred that the most cruel tyranny in one's own home was preferable to living on the charity of others.

When I was here in 1868, I was obliged to skirt this reedy flat, and ascend the hills which are visible to the east, as there was then no path near the river; but now I was informed that there was a good path all the way to the sea, and that the country was thickly inhabited.

Starting early on the seventh day, we found the morning breeze carried us well through the fine open water of the river, and the outgoing tide added considerably to our way. About 2 o'clock the sea-breeze setting in stiffly made the wavelets too rough to beat against, and therefore we put up for the day at Zihlangu's kraal on the right bank of the river. The ground was being newly dug up, and the huts were evidently only recent erections. We were informed that the opposite bank of the river was as yet uninhabited, being more marshy than this. Here the water of the river is decidedly brackish, but the natives procure drinking-water from the ponds and almost

stagnant creeks flowing towards the base of the hills to the east, where the Inkuluzaan runs. The banks were now low and apparently marshy. On the west side small creeks were occasionally passed, but on the other bank the path was uninterrupted by any streams. Having been hospitably entertained as usual, we prepared for the last day's journey; but as the canoe might not be able to reach the sea before the ebb-tide, I determined to walk down, as I particularly wished to ascertain the tidal hour, and mark the rise and fall.

As the river wound about considerably, we struck across the grassy flats for 5 or 6 miles, and found only a few huts just being erected on the magnificent alluvial soil, which bore every appearance of being occasionally inundated. About 10 o'clock we came to a peculiar sandy ridge, running out into the plain from the main ridges in a very curious manner, for some 4 miles. From the appearance of some arenaceous limestone, it would seem that a substratum of compact limestone forms the spine of this sandy ridge, which has thus resisted denudation or degradation to the general level of the alluvial plain. Fresh-water springs are found along its sides, and the ordinary scattered bush of the country covers it; showing that it is part of the original line of blown sand which existed when the sea occupied this ancient delta. The presence of fresh water and the elevated site attract the inhabitants that are found plentifully upon it. They are Tongas; few Zulus being found much south of Sidudu's.

Buffalo spoor was seen, and many bones and horns were found strewn about the kraal.

Towards the sea, the high sandy ridges limited the view, and below them mangroves lined the banks of the Inkuluzaan river, as I supposed it to be. Passing over this rather picturesque spot, we again descended to the flat, and approached the river. The tide was now nearly out; and the current running along with a swift, smooth, determined appearance, seemed rather to embarrass some hippopotami when they got into the deep water. They apparently preferred to get a footing on a convenient mudbank thrown down by the Silandaan river, which debouched into the main stream on the right bank, just above Matamini's kraal, where we had now arrived. The view from this kraal is the most picturesque that I had seen since I landed at Inhambane. The high ranges bordering the sea were dotted with clumps of bush and open grassy spots, breaking the monotony of this generally flat country. Directly opposite, a red sandy hog-backed hill, called Inandine, is very conspicuous, and appears to be connected with some broken country extending down to the sea; the view of which, however, is cut off by a range of hills,

one point of which is of considerable height, and capped with red soil.

The river itself has a margin of high mangroves, looking like fir-trees at a distance, and its wide and meandering tributary, the Silandaan, in the middle distance, backed by the green marshy plain and brown grassy hill, make a pleasing effect. On the left hand down the river, the rises are mostly covered with dense scrub, and have large bare patches of white sand glimmering in the sunlight.

The last ferry is situate at Matamini's, and is the one generally used by travellers between Inhambane and Delagoa Bay. I believe it to be the last ferry for practical purposes, though there is one more about 3 miles nearer the sea on the east side of the Inkuluzaan river. We crossed at Matamini's, and found two small creeks running into the river, as we passed along its banks for 3 miles. We then turned across the flat, and came upon a clear stream of water, completely filled and overshadowed by a kind of palm-tree, somewhat like gigantic grass, covered with a kind of large, blunt, thorn-like knob, and having roots standing out from the ground like those of the screw pine.

The water in this stream was about 2 feet deep and 50 yards wide, and was quite fresh. As I waded through it, with its luxuriant growth making over me a twilight gloom, and overrun by parasitic creeping ferns, throwing their slender offshoots across the beams of sunlight, it gave me an idea of the formation of the coal-beds when the world sweltered in the vapour-bath that is so congenial to this kind of vegetation. Immediately on crossing it I ascended the hill, and found the soil on the top red and sandy, but fertile. A broken and picturesque country now extended around. Away to the left and behind, the river ran between dark, straight, fir-shaped mangroves, gradually widening until a sand-spit on the left bank suddenly contracted it as it entered the inner bay behind the bars that impede its entrance, as the surf plainly showed. Goats were at all the huts, and several springs were passed on the way to the sea-shore. Skirting the ridge and descending to the marshy plain, I reached the bank of the river just as the tide was at its highest, at 4.34 P.M., so that that may be considered the "Tidal Hour," or "Establishment of the Port," as it is called in navigation.

Having watched it for some time and marked the place, I was glad to return inland to get away from the sea-breeze, which was now blowing cold and strong, and lashing the waters of the lagoon into waves.

On returning to Pazaman's kraal, the first I had reached on

the top of the ridge after crossing the stream, I found my companions had arrived.

Notwithstanding a severe attack of fever which I had here, we moved on to Magajin's kraal, the nearest to the sea, and which is situate at the back of the hill I have named "Unbeliever's Mount." The gardens passed through were apparently fertile. This district is called Makanagwin, and that on the other side, Intshi-Intshi.

There were a few goats here, a couple of which the natives presented to us. I ascended the highest points of the hill near here, but left the still higher one, called "Keate's Cap," unascended. The view of the bars was complete. The sandy spit called Erskine Point, running out from the east shore, appeared nearly to join the west bank. From its point a bar curved southwards and westwards, and ran outwards, which at low water is almost dry. Further to the east, down the beach, another bar with still heavier breakers on it seemed to enclose the smaller one, and ran out beyond it, both ending some distance short of the opposite shore. Inserted like a wedge between them was a very broad and heavy line of breakers, extending from the western point called "Clarkson," to within about 50 fathoms of the broken water of the opposite shore. There were no breakers through a space of about 10 fathoms in the centre of the outlet, the great waves rolling in curled over the bars and broke; but only made a great heave in the channel, and continuing forward unbroken, and tumbled over on the inner bar, the channel through which being near to the western shore, was protected by the outer bars.

An unbroken channel was invariably kept open through all the bars even during stiff gales; but it was unfortunately rather tortuous, and in fact nearly the shape of the letter *S*. A vessel entering would go through the first bar leading due north, until she passed completely through it. Broken water would then be directly in front of her, and she would have to turn towards the western shore until she sighted the opening through the inner bar, a few fathoms only, and then turn sharply round, keeping the centre of the channel in a N.N.E. course, until the entrance of the true river is reached. There would be 4 fathoms of water after passing the mouth of the inner bar, and the same in the river itself.

As my boat was not fit to go out to sea, even if I could have got a crew (which I could not), I cannot speak as to the depth of water, but I should think there were 3 or 4 fathoms to be found over the bars.

We had a stiff north-west breeze once whilst there, and the passage through the bars was still unbroken. Great caution

would have to be exercised in entering the river, as a strong current sets out at ebb-tide against the western shore (within the inner bar), which would inevitably run a vessel in it, as she has to approach within less than a stone's throw of it. The vessel must on no account enter except just before flood-tide, and not when the tide is running down. When once within the river there is plenty of water, even up to Inyama's, for a 200-ton vessel; that is about 60 miles by water. It is altogether a more navigable and larger river than the King George's (Umkomogazi), or the Mapoota (Usutu) in Delagoa Bay, and is singularly free from islands. Beyond the one at Sidudu's, which can scarcely be called one, there is not another on it, except a small patch of reeds just below Inyama's. As far as I can ascertain, the King George's River is never more than 200 yards, and usually only 100 broad (in this matter I again contradict Captain Elton's account); but the navigable portion of the Limpopo is usually between 300 and 400 yards across, and the upper part of it in the dry season 100 and 150.

Looking inland, the whole of the alluvial plain of the Limpopo can be seen in its green, grassy covering stretched out beneath.

On the right bank, between this river and the hills, is a flat, covered with reeds and palms, very marshy and unhealthy, I should think. Farther inland, patches of reeds betoken an occasional pool. On each side are sandy and bushy rises, of a dark grey colour in their winter nakedness, and far away on the faint blue horizon a little roughness is seen, indicating the elevations about the Saguti River. It is one of the richest valleys in the world, calling aloud for capital and energy to develop it. On each side of the river alluvial patches form the beginning of those bush-covered and worthless limestone plains that fill up 90,000 square miles of this part of South-east Africa. Worthless they are to all but the Kafir, who ekes out his miserable crops with rats and such other vermin as nature grants, and with such game as is found in the more favoured spots. To the left, Inandine and the other high hills near the sea complete the panoramic circle.

This point is nearly 450 feet above the river; but "Keate's Cap" is considerably higher, and is a well-marked point for maritime purposes. Two caps of bush, with a bright red, sandy patch between them on its very summit, make it a very conspicuous landmark. It is, in round numbers, about 600 feet above the sea. These hills, together with "Elton's Hummocks" on the large sandy flats at their bases, and the bare blown sand on the eastern shore, rising in one place to a high conical hill,

called Dubois' Dunes, mark the embouchure of the river beyond the possibility of mistake.

The latitude, as determined from the natural horizon in 1868, was s. 25° 15′; but the mist from the surf, and other circumstances incident upon such an observation from the shore, doubtless affected the result. Captain Owen's determination was 25° 11·6″, a difference of 3·4 miles. On this occasion the mean of several stellar and solar observations exactly agreed with the celebrated surveyor's determination, namely, latitude s. 25° 12′.

The longitude by lunar distance could not be determined on my former journey on account of adverse circumstances; but on this occasion was found to be 33° 45′ E.; disagreeing, therefore, with Captain Owen's chronometric determination by 14′; his being stated 33° 31′ E.

I pretend to no great practical acquaintance with the observation by lunar distances, so that doubtless Captain Owen's longitude is more correct than mine. I had brought a ship's chronometer with me, but the jolting on a Kafir's back, and the violent changes of temperature, threw it entirely out of order, so much so, that, although the rate was steady when stationary, it was eccentric and the error large when carried about. It was therefore quite useless to tell the Greenwich time, and thence the longitude, and was merely used to beat time for an observation. As our watches were stopped by their immersion when the boat upset, of course the chronometer proved invaluable, but not more so than an ordinary watch would have done.

We went down to the shore on the 18th, and stayed there until the 23rd. We crossed over and found the deepest water in the channels near the east bank, 4 fathoms. I made some soundings, but could get none of my party to venture in the crazy canoe more than twice, and therefore the survey was altogether spoilt.

I measured a base line of 250 fathoms, and threw together some rough triangles, to get a sort of general idea of the course of the river, and definitely and finally settled the question as to its breadth. It is, at the actual mouth, exactly 131¼ fathoms across at high-tide. Here again I contradict Captain Elton's hasty statements. The sandy spit named Erskine Point, enclosing the lagoon and harbour called Port Alice, is at times overflowed by the river when swollen, and even by the sea when high winds from the south and spring-tides set in together.

On the 24th, as soon as I had completed the survey, as well I could with this boat, and determined the position, Mr. Dubois returned to Magajin's kraal, and I with a Kafir went up the river in the boat about 6 miles to Matamini's; Mr. Dubois

agreeing to walk thither, ascending the hills so as to avoid the marshes.

As the constant and strong breeze which blows from the sea makes the ascent of the river much easier than the descent, though against the current, we went at a good speed, and got to Matamini's early in the day.

We reached Issigamby on the 26th.

27th.—Starting early next morning we arrived at Intshi-Intshi's. Though the day was showery we made the distance easily, and could have doubled it, showing how the sinuosities of the river had lengthened the journey by water.

28th.—The next day we crossed the river in a canoe, and passing through Sivungatana's, were warmly received by that fine fellow, and welcomed as an old friend. He is the only Kafir on this trip that sincerely asked me to stay at his kraal for friendship's sake; but we declined, and made a good day's journey, crossing the Mununuwane three times, and the last time in a canoe.

The day being drizzling and cool, we slept at Magoondan's on the Limpopo. The Limpopo is usually called Miti by the Zulus, Bembe by the Baloyia and Tongas, and Ouri by the Basuto. Here the river was narrowed by a sandbank to about 30 yards, but too deep to ford; therefore we crossed in a canoe. It is called the Ishidwasheni Drift. It was just below this place that I crossed the river with 3 feet 6 inches of water on this ford in 1868. We saw many cattle throughout to-day's walk, and several kraals. The soil was fertile, and there is no richer land in the world than the Valley of the Limpopo, filled up as it is by alluvial deposit.

In the heat of the day we rested in the shade. We reached Manjobo's in the afternoon, with a supply of two goats (which we had received as presents) beyond what we could eat; but we knew that Manjobo's kraal was a hungry place. On our arrival we found that the Christianised and educated native whom I had brought from Natal, and left in charge of the things at Manjobo's, had got rid of three hundred grains of quinine in solution that I had prepared just before I had left. I pointed the bottle out to him, and said, "If you get fever, take a couple of teaspoonfuls of that medicine after a purgative." It appeared that he thought that prevention was better than cure, as he had drunk the whole, with another fellow's assistance, in twenty-four days.

The navigable and commercial capabilities of the Limpopo may be summed up thus: It is difficult of entry, and has 60 miles of navigable water, reaching 25 miles in a direct line, and flowing through a fine alluvial valley 15 miles broad.

The productions are hides, horns, native furs, gums (including copal, I believe), ground-nuts, vegetable ivory, ivory, orchilla lichen, mangrove poles, perhaps a little cotton (which grows wild, and is used by the natives), honey, and beeswax. Its advantages of position are its proximity to Lydenburg, where bread-stuffs are grown. To the new gold regions there the distance is 170 miles in a straight line, and it is near to the northern parts of the South African Republic. Its principal disadvantage is the fever prevailing there, as well as at Delagoa Bay, Inhambane, and all the other towns on the east coast north of the 27th parallel of south latitude; but which does not extend beyond the foot of the mountain steeps that everywhere run more or less near to the coast as far as Abyssinia. These plateaux of Africa are (at all events in the southern parts) generally as healthy as Madeira.

Manjobo was not now at his kraal, and kept us waiting ten days before he returned. He still persisted that he had no power to provide bearers, and added that war, not goods, was his business.

On Monday, the 9th of October, we started; and as no bearers appeared we left the things behind, and travelled only a short stage.

Next morning sufficient men were procured to take us to the confluence of the Saguti, crossing that river at the same ferry where I had had a dispute with an extortionate ferryman. He never appeared for his fathom of calico adjudged to him by Manjobo.

Next morning we made a short stage to Hlalugwan's, at the confluence of the Shohozoli River with the Limpopo.

Hlalugwan's is not far from Sidudu's. As no bearers could be collected the next day we were obliged to stay; but on the second morning we made a good start, and almost immediately crossed the deep marshes and pools that everywhere settle at the bases of the hills. We found some papyrus-rush growing in them about 10 feet high. Ascending the slopes, we had a fine view of the country towards the sea, and of the valley. We found many inhabitants, and much cultivation of the ground-nut. The bush was dense and high, indicating a better description of soil than what is generally found on those plains away from the river alluvium. Here we found some of the magnificent Mali palms at the head of a stream named Mali, from the trees.

We had now apparently just touched upon the edge of the narrow strip of country near the coast in which the lagoons were not yet desiccated; for we passed a lake on the right-hand of the road, and the natives told us that there were many

others of the same kind nearer the coast. The country now began to reassume the same character as that observed on my southward journey.

On the 15th, Mr. Dubois and some Kafirs being ill with the fever, we made very little way, but began to see evidences of Chobi industry in large clearings of bananas and some acres of pine-apples. The air was laden with the scent of the greenish-white flowers of a runner, which we afterwards discovered was the umtshanjowa, a sweet and agreeable fruit, growing in bunches of red berries, from which the natives make a very palatable wine, of a deep rich red colour. A more beautifully-scented shrub could scarcely be found. While in health no one could but enjoy the scent, but under the influence of fever it seems insufferably oppressive.

We now had attacks of fever regularly every fifteen or sixteen days, and had to lay up for two or three days at each time. I shall, therefore, not mention them except incidentally. Calomel, Dover's powder, emetics, and quinine always proved effective remedies. We each passed through about thirty attacks during this journey; and generally it was obliging enough to take one of us at a time.

On the 16th we got to Undiri's place, where we were obliged to drink water caught off the smoke-begrimed thatch of the native huts in the bark troughs already described. It was simply abominable. The country being but a sandy waste, there is no running water except in the summer.

Whole acres of pine-apple gardens were passed through by us, and we also saw some of the Umshalu fig-trees.

We now passed through a belt of fine forest, with some trees sufficiently straight and tall to have cut timber from them. Many india-rubber vines were also seen, but mostly tapped and therefore valueless.

This india-rubber vine is similar to that on the west coast of Africa, as described by Du Chaillu. It has a very rough, warty bark, and a very few leaves at the extremities of the uppermost branches, which are small and round. The fruit is about the size of a lemon, mottled with green and white when young, and yellow when ripe, and has a pleasant acid flavour. The natives make a palatable fermented drink from it. The outside rind is apparently hard, though it can be broken by the fingers. It contains about a dozen large seeds enclosed in a yellow mucilaginous matrix or pulp. The stem of this vine sometimes measures six inches in diameter, and occasionally lies along the ground for some distance before it finally ascends. It is only found in the densest forests, and in company with other lianas and creepers, and frequently on good soil.

On the 17th, a 9-mile walk brought us to Mabingwan's, who is a Chobi, but tributary to Umzila, and chief of a large district. He is a fine old savage, and has the reputation of having the finest wives and daughters on this coast. Mr. Dubois being sick, we could not go on for two days.

The whole of this country about Mabingwan's is very sandy and worthless, though close around his kraal there appears to be a ridge of slightly better soil. It is also very heavily timbered, but soon opens out again into the dreary Umtonto sand. The spring is at the head of a long open grassy flat that looks like the bed of some ancient river or estuary. We met here some Portuguese Kafirs trading india-rubber and beeswax. Hitherto we had made no northing, or rather had been veering to all points of the compass, gradually getting more east. Stellar latitudes at Mabingwan's showed me that I was in lat. 24° 41′ S., and therefore exactly in a line with Manjobo's residence, which we had left eleven days before, and which was only 24 miles (of longitude) distant. This is a specimen of the rate at which we travelled with the Royal bearers of Umzila.

On the 20th we made about 8 miles to Bitin's Kraal, where I had fever, but was able to push on to another kraal. On the 23rd, we passed through the Umtemby district, called after that south of Lorenzo Marques by the inhabitants, who are emigrants thence. There are several sheets of water or lakes there; but there are more further to the south-east or coastwards, as the natives said. We were going parallel with the coast at about 20 miles' distance. The first lake we passed was called Masegwan.

On the 24th we struck upon a reedy lake called Isibingo, about 4 miles long. It is salt, and contains hippopotami. The natives say that there is game in its neighbourhood, consisting of gnus, pallahs, and sable antelopes; but we saw none.

We now struck across a white sandy ridge, covered with Umtonto wood, and came to another open spot, where we found excellent water, and put up at Pungwin's Kraal. There is game near here, and hippopotami are in the lakes that abound between this and the sea. The soil, excepting in these old lagoons, is worthless sand; but the country seems to be open and pleasant.

The next morning (27th), after the usual delays about bearers, we procured about thirty. Leaving the remainder of the goods to follow, we got to Hlambangati's that afternoon, through larger and denser forests than usual.

This was the first stockaded kraal in this district of thus fortified villages. The stockade here was old and worm-eaten;

but the huts were of a better description than we had hitherto met with. They had side walls about 4 feet 6 inches high, and doors on hinges. These doors were usually made of the dried stems of the Mali palm put into a wooden framework, which worked at one end on a pin at the bottom and top, fitting into holes in the lintel and threshold. To the height of the knees the doorway was blocked up by two planks, to keep out the dogs, fowls, &c. These planks are often curiously carved. The huts, though high, were obstructed by a sort of wicker-work staging for storing grain lower than the head; so that often forgetting this, in getting up, a blow on the pericranium made them somewhat uncomfortable for any but Kafirs.

This stockade was but a small one, containing only about 150 huts.

We did not leave next day, but the day after we made a start, and soon came in sight of the Eshicomi River (which is the Umkelinzi under another name). As it was unfordable in a straight line, and the native boats were too slight for the packages, we had to go up some distance to the ford, which we found to be about chest deep, and about 40 yards across.

Blue water-lilies in bloom and with large round leaves covered the stream in all directions, at times completely hiding it. Near the ford great quantities of the Mali palm were seen, making quite an imposing sight.

After fording, we passed down the stream again, and ascended the hills that border the river on the opposite side, where we discovered outcrops of limestone. In the drift there was a reed fence for fishing purposes. The natives often obstruct the stream with these fences, leaving only small openings, into which they insert creels or fishing-baskets, which the fish coming up enter and are caught.

We arrived at Mangorby's stockade the same evening. This was built on the bank of the river, which had now widened to about 600 yards, and took the name of Inyarhimi. There were about 1000 inhabitants in this stockade.

The Chobis are a fine race, lighter in colour than either the Tongas or the Zulus, and with more finely-cut lips and features. They are decidedly of the Basuto type, and do not belong to the same stock as most of the other natives of the country. They disfigure themselves frightfully by lines of lumps (less protuberant than knobs) down the centre of the forehead and nose, from ear to ear across the upper lip, and from ear to ear across the chin. They have a loin-cloth hanging almost to the ground, a round shield, a powerful bow, and barbed iron arrows, thoroughly poisoned.

The women wear heavy brass rings round the neck, wrists and ankles, with a short petticoat of blue calico, over which they put on what is now fashionable, called a "pannier" or "peplum" amongst us, namely, a piece of bark blanket cut into a V shape behind and before, so that the pointed ends shall hang down on each side. Where the country is less disturbed, they cultivate oranges, lemons, cabbages, and so forth, and possess cattle.

After about four hours' walk, we reached Matshunkulu's stockade. This walk was along the Inyarhimi River, on the banks of which we found the village.

Next day we made about five hours' walk, to Singabagapa's stockade, which was a very large one. Just before getting there we crossed a stream flowing into the Inyarhimi.

This was the last stockade we stopped at; but Matshunkulu's is the largest and most densely inhabited. It contains, I should think, 1500 inhabitants. They all have great numbers of domesticated bees, whose hives are kept in the dwelling-huts. The bees fly about, and do not seem to be at all ill-tempered or hasty with their stings.

The Inyarhimi River bears, as is usual amongst all these tribes of other than Zulu origin, a number of names until it enters the sea. From the ford downwards, for the 12 or 13 miles which I saw, it is about 600 yards broad, and 10 feet deep. Near the banks floating reeds grow, showing that there is but an imperceptible current. The natives describe it as continuing thus to the sea, but as being at Inkumbi's fordable. The left bank is bordered by densely-bushed bluff-like rises; but the other bank (though also densely wooded) appears to be more level. The country is of little value near the river, being mostly of white sand; but it is thickly inhabited, and apparently produces great quantities of beeswax. There is no danger to white travellers in this country, and altogether the small strip known as the land of the Chobis is a most interesting part. It is altogether undescribed, and almost unknown to civilised men. Whether the Inyarhimi (or the Zavora of the charts) is sufficiently navigable at its mouth for the entrance of large decked boats is uncertain; but should it be, a good trade could be carried on between it and Inhambane. Higher up the Umkelingi and Imyampalimpali gather the drainage, and one of these passes under the name of the U'Luize, but which of the two I have not yet been able to determine.

The whole course of this river and its confluents seems to be bordered by open grassy spaces, with pools of water and trees of vegetable ivory, where game is to be found.

These natives work well in wood and iron. Their wooden drinking bowls are celebrated throughout the country. They seem to live principally on manioc or cassava, which they eat both roasted and boiled. For summer use, when the manioc is apt to be watery and uneatable, they break up the root and dry it in the sun. In this state, when raw, it tastes like arrow-root biscuit, and when pounded into flour, it makes a good sort of bread, and is, in fact, the only native production that is sufficiently glutinous to form bread in our sense of the word.

A day's delay now occurred, as the next stage was a very long one. About fifty men had arrived, with whom we started, leaving some loads behind. We ascended the rises that border the river, and found them about 200 feet above its level. Passing on first through native clearings, and then through dense bush, we came to a marshy stream, which is the same as that formerly described as entering the Inyarhimi near Singabagapa's, but now about 5 miles back. It appears to rise in the flats a few miles farther on.

We now passed over a sandy and bushy ridge to extensive open ground, or rather a grassy flat with stunted ivory palm, called Inyansuna. Four miles over this brought us to a running stream flowing from the north, called Monjo, 18 feet wide and 12 inches deep. It enters the Inyarhimi. The waters are brackish. The flat now became covered with pools, sometimes fresh and sometimes salt. The formation was arenaceous limestone. A large lagoon or salt lake had evidently been the former occupant of this tract. Some game was seen, consisting of quaggas and gnus. We were not able to get across to the habitations on the other side that night, and were therefore obliged to camp out under a clump of trees. Next morning's walk, still over the flat, brought us again to the sandy ridges that surround it, and to my former path. We rested at a kraal during the heat of the day, and towards afternoon started again. We had not gone more than a mile on this fearfully sandy tract before we espied a bare stretch of loose sand, extending, as we imagined, 4 or 5 miles in front of us. This staggered us altogether, and therefore we determined to wait for the cool of the day. When we did cross it we discovered that it was the bed of a desiccated lake, the bottom being quite hard, and composed of the usual sandy clay of the limestone formation that crops out in all directions. It is called Inyatsaki. It appears that I had skirted it on my former downward journey, and crossed the Eshigibi stream, which flows into it, and was then spread out into a large brackish pool, which we now passed. A few minutes more brought us to the kraal,

where we stayed for the night. Next day we made Mahonti's Kraal. He is the Chief of Makwakwa, which district we had now entered. A strong stream—the Etusin—flowed from the north, past the kraal, and doubtless joins the Umkelingi River.

The next two days, fever attacking me, we were delayed. As the goods travelled slowly, we arranged that they should go straight from Mahonti's to a place called the Manhlin, about 80 miles distant in a north-easterly direction; as there were no Kafirs of Umzila's between this station and that, the country being under Portuguese rule.

We left for Inhambane, striking my former route again at Maranjin's on the Inyanombi River, and passing through the usual bush, and over sandy soil which was now (being in the Inhambane basin) more fertile. After leaving Mahonti's, we passed up the reedy River Etusin to its source, and then entered a dense bush covering a rise on the road. We had water out of a hollow tree called Intokwi, which forms a landmark for miles around, as it overtops the rest of the bush. On the 17th of November we again arrived at Maxixe, Mr. Laforte's farm, on the side of the bay opposite the town of Inhambane.

We started again on the 25th of November, but did not go far. On the 26th, early, we arrived at Umzulumbu's, a chief tributary to Umzila.

I have omitted to mention that about 7 miles after leaving Maxixe we crossed the Inyanombi River, lower down than Maranjin's, and soon after the Pipan stream flowing into it.

After a long and tedious dispute with a chief about bearers, it was not until the 27th of December that Mr. Dubois was able to get any, and then only fifty-eight. They arrived on the 1st of January, and, on the 3rd I started, leaving my man Matthew in charge of the remainder of the goods.

Immediately after leaving, I began to ascend a high ridge or hill through dense bush and clearings of red sandy soil. On the top a fine view of the ocean was obtained. This spot the barometer showed to be 860 feet above the sea, which is quite an unusual elevation when the extraordinary general flatness of the country is considered. The whole coast, from Natal upwards, is bordered by a ridge corresponding to that near Durban, and called "the Berea." At times portions of this ridge lie detached from the mainland, and form islands, such as Inyak and Bazaruta. In Natal, and throughout the Zulu country, this ridge is backed by hills rising higher, step by step, towards the interior; but from St. Lucia Bay northward, towards the Zambesi, the back country is a sandy flat, covered with bush; the mountainous country lying farther away towards the in-

terior, until the Limpopo is reached, when it is distant 200 miles from the coast. This coast-ridge is composed of blown sea sand, fertilised in some places by the decomposition of ironstone and vegetable débris, and thus assuming a red colour. At other places, again, it remains in its original sterility. This ridge encircles Inhambane, in a kind of basin of fertile soil; but, as a rule, this vast plain may be characterised as a "mitigated desert." This great limestone plain of South-east Africa is hemmed in by the mountains to the west, and is somewhat curtailed towards the north by an extensive spur thrown out by them towards the coast, and called Gorongosi, to the north of Sofala, and near the Zambesi. It seems also, from different travellers' accounts, to extend northwards, along the coast, even to Abyssinia, being more or less broad in different localities.

On the other side of this rise the view was terminated by a sea of bush, extending to the horizon, and there drawing a straight line similar to that seen on the ocean. The blue colour of the distance adds to the illusion of its being a sea-view, the ridge apparently falling away here, and rising again a few miles farther on.

The next day's walk was, as usual, through bush, sand, and open spaces, with grass and ivory palms. The succeeding day, about noon, we crossed a marshy stream called Kita, or Umatshi (lat. s. 23° 16′), which goes into the sea to the east. I notice this particularly, because the maps extant are entirely wrong with reference to this coast. Such information as is given is incorrect as to position, and many mythical streams and mountains ornament the sheets. This country is called the Dibin. To find out the name of any district rightly is usually a difficult task, as I have been told, by the most astute scholars of the native tongue. That fact, together with the loss of my Journals, will account for the paucity of district names throughout my travels.

On the 4th of January I came to some people of quite another tribe, and, in fact, of different race, calling themselves Malongwe, or Marongwi, and being of the Basuto type; those in the Portuguese territory being runaways from the "Manhlin" and "Hlengin" adjoining. They build the walls of their huts of bark. Stakes are driven in, two and two together, in a circle the size of the intended hut, and a piece of bark having been stripped from a tree is flattened by the action of heat, and bent into the shape required, and when placed between the two uprights it is kept in its shape. The circle being completed thus forms the walls, which are about 3 feet high. The roof is then placed upon it, and the hut is complete. These huts are usually very small. The insides are often so filled with *impedi-*

menta, the floor, withal, so broken, and the walls so buggy-looking, that I always declined sleeping in them; and now made my bed under some fine baobabs, that stood in the clearing, dwarfing, by their giant proportions, men into ants.

Another curious custom is to draw snuff up their nostrils through a long hollow bone (from a bird's wing), about 18 inches long, which they hold in their right hand, and having previously thrown the snuff into their left, they thus take it up. Several can, of course, snuff at once by this plan from the same palm. They usually wear the bone on their necklace of charms and other dirty-looking rubbish, each piece of which is an infallible "fetish" for some purpose or other. They wear the loin-leather of the interior tribes of this type. This loin-leather has a most curious appendage, or ornament, as I suppose they would call it, sticking out behind like a tail or stump. It is composed of one, or sometimes two, heart-shaped leathers, the size of the palm of the hand, ornamented with brass, and projecting in a most obtrusive manner, which must be seen to be realised.

No water was to be had at this kraal except that procured from the hollows in the baobab trees. I had heard of the "Hlenga" country as a term synonymous with thirst and hunger, and every privation pertaining to a desert; but until now I had not realised their proximity. As the water was stinking, I did not enjoy my very simple meal so well as usual. In these waterless tracts the natives take advantage of the natural aptitude of the baobab to form large hollows, and enlarge these artificially by fire and adze, to catch the rainwater. When the supply fails they go to the river, and live there until their reservoirs are filled by the next wet season's rain, such as it is; but this is an almost rainless country, though the sky, from 10 o'clock in the day till sunset, is constantly filled with cumulus clouds. These clouds, however, float onwards towards the hills, leaving to these thirsty lands only the benefit of their fleeting shadows. I account for it in this way: the forests, or woods, which universally cover these plains, are mostly scattered, and the trees of a straggling, ill-leaved description, called either Umtonto, or Umtshanatsi (Mopani), which throw little shade, even in the summer season when they are in leaf. The land, being but of slight elevation above the sea, becomes intensely heated by the sun, which causes a great ascent of rarefied air, and consequently a vacuum. The air from the sea being cooler drifts along, and being moist, forms these heavy masses of cloud which, meeting no elevations in their passage westward, sail through an equalised temperature, and deposit none of their moisture until they meet the hills, where being forced into a

colder stratum, they condense, and fall in the form of drizzling rain. Such was actually the case, as I found when I afterwards reached the mountains. After sunset, until the early morning hours, a calm prevails, the sea and land becoming of equal temperature.

Towards morning, the land having radiated its heat more rapidly than the sea, is actually the colder of the two, and sends forth a feeble breeze, which dies away again as the sun heats the earth. In the mountains plenty nearly always reigns; though perhaps, as was the case when I went past, the people of the plains had reaped no crops for two or three years, except in favoured localities.

The route now passed out of the actual territory of the Portuguese, which ends about lat. 22° 50′ s. into the Manhlin, or Umzila's country. Next day I passed over a large grassy space, which the Kafirs said had been at one time full of cattle, until Shoshongane (Manukuza) attacked and plundered them of their property. I saw the remains of old cattle kraals. There was an old well about 4 miles from the kraal.

Proceeding over a sandy, bushy tract, bearing traces of the passage of elephants, I came, on the 11th of January, to Imboban's Kraal. Matshenisa was the petty chief in charge of the district, and his kraal was still 12 miles more to the west. The chief of the whole of Manhlin was Sifooku, or Siconyan.

The water at this kraal was brought from a well about 2 miles away, and was clear and good. The well itself was about 20 feet deep, showing a loose, chalky formation above, and a hard limestone below, in long blocks, lying imbedded in stuff like the upper débris. When the water is first drawn from the well, though apparently clear and good, it smells most abominably; but when exposed to the air for 24 hours becomes sweet.

There is a fine outcrop of hard limestone here, with great quantities of fossils, of which I broke off some specimens; but the rock itself was too tough to break, and I had no cold chisels to cut them out with.

The natives here have a novel way of hunting. They procure a vegetable resin, or gum, and lay it in the paths frequented by the smaller antelopes. They say that the game step in it, and that after a time their hoofs crack and become sore, and then they can be caught with the hand. I think a more feasible explanation is that they get their feet so clogged with leaves and sticks that they cannot run. Mr. Dubois says that he himself has caught game running over pot clay after heavy rain, so that it is credible that they may hunt in this way.

Great quantities of different kinds of drinks are made out of the wild fruits, which ripen mostly at this season. One, from

the seed of the india-rubber creeper, is slightly acid, but very palatable on a hot day, and is called Imbunga. Another, called Umtshanjowa, I think I have already described. Then there is that from the fruit of the water-boom, and others too numerous to mention. In fact, fruit in a Tonga's mind is synonymous with drink, and they turn everything of that kind into it. My list of the wild fruits is lost.

There were two Albino children at this kraal, a boy and a girl, the latter about 15 years of age. I only mention this fact to remark that there are an extraordinary number of them amongst the Tongas in this country.

It appears that the whole district was disturbed because its Zulu governor (Inhlamvogazi) was in it; which meant, further, that 200 hungry Zulus were running about in all directions, plundering the Tongas; and, besides, that the chief was demanding tribute. The only kraal that had a goat in its possession was the one we were staying at, and that was only because, when Inhlamvogazi's messenger came to demand goats and fowls, we told him to right about face and go back, or we would thrash him On the 17th I went to the chief's kraal, and saw this Inhlamvogazi, the Zulu governor, and taxed him with stopping our road, and so on. He denied it, and said he was desirous of assisting us. He gave us a goat, and appeased our wrath by a smooth tongue.

Nevertheless, we got no men, and therefore we determined to leave the goods to their fate, and proceed to Umzila's by ourselves, and complain that we could not get on. No one was to be hired, or otherwise procured, to go there instead, so that we had no alternative. Accordingly, on the 28th, we started alone, as both Umzila's messengers, who had the general direction of the route, refused to leave the packages. All the baggage we had amounted to ten loads, so that, though the usual system of carriage from kraal to kraal was adopted, we made pretty good walking, but were, of course, obliged to submit in our course to such roundabout ways as the bearers chose to take us. As we left the coast, the country, though still as flat as ever, became more interesting, and the soil was apparently better. Sometimes dense bush was met with; but generally the country was covered with scattered trees, in many instances attaining to the dignity of a forest. Some fine families of baobab trees were passed almost daily.

Water was extremely scarce, especially from Matshenisa's westwards. In many places it is procured entirely from the hollows in the larger trees; an uncertain source of supply. Consequently in the drier season many of the more direct paths between places are closed, and travellers have therefore to sub-

mit entirely to the natives' guidance, though the compass shows that they are turning and twisting about from day to day. For several days together we had to drink the tree-water, and at other times the water caught off the smoky thatch of the huts, which was still more horrible.

The Tonga (common) Kafirs invariably build their huts 5 or 6 miles from any permanent water, though in summer pools supply their wants more readily. In the dry seasons these pools evaporate; thus bodies of Umgonis, or Zulus, that roam over the country in the dry season, levying tribute upon the Tongas, are too much encumbered by the burden of carrying water to stop long. They cannot make the Tongas do it for them, for beyond the head man of the kraal, and one woman, none are to be found, as they run away to distant parts of the bush until their neighbourhood is rid of these marauders, and then return to their homes again.

We came again across much fresh elephant spoor, but saw nothing in the shape of game. Occasionally strips of fine black land would be passed, but as a rule the soil was red and sandy. We saw many outcrops of limestone-rock which would make respectable marble.

Several places were infested by a large grasshopper, like a cricket, which lives in holes in the sand. The noise they make is quite distracting at times, and the tremor they cause in the air and the ground was sometimes so great as to shake the surface of my mercury in the artificial horizon to an inconvenient degree. They are exceedingly alert and difficult to catch, but with a lantern and a heavy stick I usually managed to despatch the forty or fifty in my immediate neighbourhood, and then make my observations in peace.

The 1st of February found us at Pilan's Kraal, where they were celebrating a "wake," much to our disgust. It is customary when a native dies for all his friends and relatives to the last degree of consanguinity to assemble and cry over his corpse. No matter if he is buried, and they arrive a month afterwards, they still cry. When the death is announced, the women immediately cry, "My baboo, ta, ta, ne!" and keep up a sort of low song all the time, breaking out at intervals with the "My baboo!" The men sit calmly by, looking on; but the women keep up a constant howl, and every now and then run frantically about the kraal, dragging an old piece of rag or skin (which is supposed to represent their clothes) in the dirt. This is kept up till the new moon appears, with which the wake ceases. They are considered unclean until they have taken potions from the wizard of the district, who attends to administer them. Usually the beginning of the wake is plentifully supplied with

goats and beer; but both these in this district are as scarce as the rain.

On the 3rd, having arrived at Umkingwa's Kraal, they said we could not go direct, but must turn up to Sifook's, as there was no water on the other road for three days' walk. We calmly submitted. The country again became poor and sandy, though the water was better and more plentiful; but still always some miles distant from the kraals.

On the 4th we arrived at Sifook's, the head of the Bila-Kulu tribe, and chief of the Manhlin. We found the kraal situate on the banks of the Gabulu (not Gavuru, as the Portuguese persist in calling it), lat. s. 22° 16′. In the most recent maps there are several considerable streams placed between this and the Sabi, running in separate courses to the sea direct, and which are entirely mythical. The Gabulu rises about the 23rd parallel of lat. s., and flowing parallel with the sea, empties itself north of Bazaruta Island, into a place marked Maramone Bay on the charts, about lat. s. 21° 7′. Doubtless the river has been touched at several places by traders, and being generally within 10 or 15 miles of the coast, was thought to be a separate river at each place, and to go straight to the sea. Thus this one river has been cut up into several in the maps. As I before remarked, the coast is bordered by a ridge of hills. The Gabulu, being merely a long reedy marsh, though deep, has no current, and could not force this rampart until approaching the Sabi, whose more powerful waters had levelled the passage, and it was thus enabled to find an exit. It is navigable for boats some distance up to the Makoban district, not far from here. The island of Bazaruta being too barren for cultivation, the inhabitants depend entirely upon this district for their supplies. There are no rivers flowing into the sea between Inhambane and the Gabulu mouth, except the little stream Kita.

On the night of our arrival we witnessed a most magnificent aurora australis, a very unusual thing in so low a latitude. The whole of the southern sky for 60° round the pole, and more still towards the zenith, was of a brilliant rose-colour, with waving bands of white that waxed and waned alternately, and almost extended to the zenith itself at one time in broad belts, and then in narrow but more brilliant stripes. It lasted until the morning light obliterated it.

The river here is about 8 feet deep; but, with the exception of a small open space in the middle, no water is to be seen for reeds. It is about 70 yards wide. We noticed stages here about 6 feet high, with ladders to them. We were discussing their use, when we saw the men and women make fires beneath, and ascend into the smoke to sleep. This was to keep

the mosquitoes away. We did not find them at all troublesome; but perhaps there are seasons when they may be so. A party of hunters came back from the chase with several small antelopes killed with their poisoned arrows. The wound is simply cut out. The meat is quite eatable and good. If the wound is not cut out the meat becomes bitter, but is still wholesome.

On the 7th of February we left Sifook's, and struck to the west, passing through park-like scenery, the trees being large and scattered, and the soil and grass better. But it was a land of thirst, so much so, that we had an extra supply of bearers to carry water. On our arrival at Matimbanyana's in the afternoon, we found that we had entered the Hlenga tribe, and that he was one of them. To our surprise the water was good, and (what was more remarkable) obtained from the hollows in the baobab trees. There were some fine ones here. One I measured was 85 feet high and 35 feet in circumference; but another, though not so high, measured 61 feet round. The soil was red and sandy, and (though the climate is arid) it appeared to be fertile.

It is a curious circumstance in the district that baobabs generally indicate habitations. Even in those cases where there are no inhabitants now, traces of ancient cultivation about them can always be discovered. The probability is that these trees naturally collect in groups at distances apart, and that in this universally flat and bushy country they serve as landmarks, around which the natives congregate even where the water is no inducement for them to do so.

The Hlenga tribe are essentially people of the bush, more so than any others. In most parts of it they live almost entirely upon meat, and are like bloodhounds in the chase. Should an animal be hit so as to drop blood, they follow it, and sleep on the spoor until they get it. They seem able, like vultures, to find meat apparently beyond human ken. Many a time I have had great difficulty in keeping even one to guide me when they saw vultures like specks in the sky trending in straight lines to carrion perhaps miles away.

They have an ingenious way of laming elephants, and then shooting them with poisoned arrows. In the elephant tracks they make holes about the size of an elephant's foot, in the centre of which they plant a stake. The elephant steps upon it, and is lamed. The stick coming out of the ground rather than out of the foot, remains protruding, and of course hurts the animal every time he attempts to walk. He remains, therefore, standing until they approach and shoot him.

On the 8th and 9th we passed over some fine undulating country, with a chocolate-coloured soil and magnificent grass.

Water was still scarce, and usually obtained from trees in the winter; though from the green rushy dips in the ground plenty could probably be procured by digging a few feet. The crops appeared to be shrivelled up by drought, and past all recovery.

We arrived at Umhazwi's, Chief of North-east Hlenga, and found the whole place full of Umgonis, and the poor Tonga Chief at his wit's end. Nevertheless, we were treated well, and had good though muddy water. As a rule, we slept in the open air.

On the 11th we slept at a kraal which got its water from one of those deep limestone wells that seem beyond the powers of the present inhabitants to dig. Apparently a superior race once lived here, and left these tokens of their former presence, together with the rough handicrafts that the Hlengas and Mandandas are celebrated for now; such as the manufacture of knives and other iron work, and of cotton-stuffs. The kraal was quite 4 miles from the well.

The country continued good, with large out-crops of marble-like limestone, which was in one place regularly crystallised and well formed.

Arriving in the evening at a kraal, we found it deserted, and could discover no water. We therefore had to go about 24 hours without any;—no joke with the thermometer at 108° in the shade, and after perspiring so freely from walking.

On the 14th the soil became poorer, but water more plentiful. The country was now varied by mounds, made apparently by ants originally, but which were now quite equal to small hills. Thorns became more plentiful; the bush hitherto having been thornless. We made a good march of 12 hours, and got to Inyampamban's Kraal, where we had been told Messrs. Beningfield and Skilbeck were staying, shooting elephants. We found them both in good health, and enjoying themselves greatly. As we were in want of rest, we stayed until after they had left for home on the 2nd of March, and on the 6th we continued our journey.

The early mornings now became so cold that we were glad of a blanket, an article that had been cast aside since September last. A good warm coat was also found acceptable at starting in the mornings.

A 15-mile walk, over a grassy and sandy country dotted with clumps of bush, brought us to the Sabi, the descent to which was down precipitous limestone bluffs some 250 feet in height. Having been so long on dreary flats, these bluffs presented a pleasing contrast; backing one another until lost in the dim horizon, and with the Sabi flowing between them forming a

fine view; the water so blue and its bare sandy bed so yellow; and the whole framed in by hills covered by forest. A peculiarly deep valley, with a dry gully at the bottom, joins the river here. The district is called Impanzi. Umgonis live in the valley, so that we had no difficulty in getting fowls and other food, as we had amongst the Tongas, who are robbed of everything by these Umgonis.

The bed of the Sabi was about 1000 yards across; but the stream of water in it was not more than 100 broad and 4 feet deep; the rest of the width being sand.

The hills on the banks of the Sabi are but slightly raised above the plain, and can only be ascertained to be so by the view obtained on each side, east and west, to the horizon over a sea of rolling bush.

Soon after starting on the 7th we crossed the Korwah on a fallen tree, which is a stream flowing from the south. On the 8th we reached Sondaba's Kraal at Inyaveni, a spot well known from a large marsh or pond in the valley on this side of the Sabi, and bearing that name. We found here a good host, who gave us a sheep, and offered me a tusk of ivory, which I declined accepting.

Here, for the first time since leaving the Limpopo, our coffee was ground between stones. Hitherto, the country being stoneless, the natives used for this purpose the wooden pestle and mortar in which they pound their corn.

On the 9th we crossed the Sabi, which is here in lat. 21° 18′ s., and runs apparently east. It was waist deep. It is quite unnavigable; for although the bed is about a mile broad, there is very little water in it, being mostly sand.

We now entered the Mandanda tribe, who extend all up the north bank of the river to the hills, but not much farther north, as the Mandowa reach from Sofala to the hills. Whenever the country was well inhabited we made but little progress, because the bearers only carried from kraal to kraal, and consequently we suffered many delays.

The valley of the Sabi is bordered on each side by limestone bluffs, one of which is very conspicuous on the north side of the river, and about 3 miles above the point where we crossed it. Our route lay westward, not far from the banks of the Sabi; though the drainage emptied itself to the north-east into the Gorongosi.

On the 11th we crossed the source of the Upimbi, an affluent of the Gorongosi, and on several succeeding days drank the water of other affluents, though we did not cross or see them. Low rises running north-east seem to divert their waters towards the sea.

The latest maps, those of Dr. Petermann, erroneously give the Gorongosi as running into the sea at Sofala. It empties itself into the sea at about lat. 20° 28′ s., some 9 or 10 miles south of that place. The cape at its entrance can be seen from the north point of Chuluwan Island. The river is navigable for some distance; but no trade is carried on there, as the Portuguese are afraid of the Umgonis or Zulu inhabitants. It drains the plains between the Bosi and Sabi rivers, an area of about 6000 square miles, and a poor sandy district of alternate bush and open grassy spots with pools of water. Game, including elephants, is plentiful in it. Hippopotami inhabit the deeper pools and stretches of the river.

Immediately on crossing the Sabi we entered the Mandanda tribe, who dress with the Basuto loin-leather, and file their upper teeth to a point. On the forehead, between the eyes, they mark themselves with a V-shaped series of bumps, and also sometimes on their cheeks.

Just along our route water was extremely scarce, though to the left was the Sabi, and to the right the Gorongosi. We were, however, on account of the necessity for bearers, obliged to proceed along the line of Tonga kraals, and, as before remarked, these people purposely live as far away from the water as is compatible with existence.

At Tibil's Kraal we witnessed the making of cotton cloth. The cotton is an indigenous plant. Three species are found growing wild: one the real cotton of commerce, another a creeper, and a third a small tree; all having the true leaf and flower of the cotton plant. The yarn is spun by hand with a piece of stick, having a square piece of tortoiseshell or lead on the end. The loom (if such it can be called) consists merely of a few pronged sticks driven into the ground, and having the web stretched from end to end on cross-pieces. The woof, being wound on a stick resembling a large netting-needle, is alternately passed to and fro. The only ingenious part is the method of getting the web to cross and recross, which is done with a flat stick threaded through each alternate strand, and pressed down to allow the woof to pass to and fro as required. The manufacture is limited to making the long strips worn by the men as loin-cloths, 3 feet in length by 18 inches wide. The cloth is strong and coarse, but clean and white.

On the 14th we entered Umtupi's district, called Magwasha, on account of the dense bush which prevails in it. This bush is full of untapped india-rubber creepers. Besides the dense bush and want of water, the most noticeable features are the swarms of red ants, which literally cover the ground, being attracted thither by the equally plentiful white ants upon which

they prey. No sooner does a tree fall in these regions than it is immediately eaten up, and converted into a skeleton of red sand by the termites. The natives are so harassed by leopards that the women are even afraid to weed their gardens in the daytime. At night every door is shut and fastened, and the hut doors there are built of hewn wood, purposely strong to resist these animals. In the morning, just as we were starting, a leopard of some kind took a fowl from the gate, and rushed into the bush with it.

Since leaving Makwakwa, near Inhambane, we had scarcely seen a thoroughly open Umtonto wood; and lately the bush had been so dense that our sticks and hands found constant employment in protecting our eyes; but on the 17th we entered a long stretch of open Umtonto woods, and felt quite relieved, and able to stretch our limbs. The barometer indicated a steady rise of level for the last two days, though it was quite imperceptible to the senses; but now we began to fancy the air became lighter, and at last we were refreshed by the sight of high, grassy hills to the west, about 30 miles away. This was the timber-clad Sipungambili, some few miles beyond which lay Umzila's Kraal. On the left hand was a depression, or valley, called Intembila, and on the right ridges of pebble and concrete limestone. The path crossed many torrent-beds, dipping to the left. The crops looked splendid, and all was fresh and green. Here I first saw my predictions as to rainfall confirmed; for the first rain fell from these masses of cumulus that daily flew over the face of the thirsty plains below.

We crossed the first affluent of the Bosi, the Timbelili, now standing in pools, but in the rainy season a running stream. Following this down through a fertile and well-inhabited country, we crossed the Murgis at the confluence of the two streams, and slept at Zunumbu's. The Murgis flows directly into the Bosi over a bed of trap, with eruptive dykes of another igneous rock of a serpentine character. This black trap dyke is the only one visible in the district, though this rock is doubtless the elevating agent, and the serpentine or phosphoritic eruption appears to have broken through and overlaid it. The next day, after crossing a small stream, an extremely stony ridge of porphyry and serpentine was ascended, until the path at the highest point was 1500 feet above the sea, as indicated by the barometer. There were peaks 200 or 300 feet higher; so that this ridge may be stated as between 1500 and 1800 feet above the sea-level. The view from the western slope was one of the finest I have seen. Due west the valley seemed to open out into the plain, and nought but the horizon bounded the prospect. To the north, abrupt, wooded mountains, capping each other,

were seen, until closed in by the grass-clad Sipungambili with its cap of timber. Turning to the east, the ridges appeared to end abruptly in a densely wooded cañon, which debouched into the Bosi, whose abrupt and wooded banks seemed to close the view. Nearer at hand the broken ridge became less and less bushy, and ended in a rough, grassy knoll, with masses of grey rock in the foreground. Beneath, the valley of the Umswelisi lay, rolled out flat as a picture, with its meandering waters fringed by evergreen trees; and it looked smiling and peaceful in the chequered frame. Descending the ridge we came to the banks of the river, and slept that night at Guegwekwi's Kraal, nearly 800 feet above the sea.

This valley of the Umswelisi is destined some day to be one of the most productive spots on this side of the continent. Sugar and coffee would succeed admirably here; and from its elevated position I believe it will be found to be quite healthy.

The Mandowa tribe, which inhabits all the hill country and the plains as far as Sofala, appears at one time to have been very powerful, though it submitted without fighting to the Zulu chief 'Cnaba, of Umsan, who fled hither from the Zulu country in Chaka's time, and who was afterwards driven out by Manukuza, Umzila's father. These people have a peculiar manufacture of coarse stuff made from the baobab bark, worked entirely by hand into large coverings. These are immensely heavy, but apparently of everlasting wear. The bark is steeped, beaten, and rubbed between the hands until it is properly triturated. It is then twisted on the thigh into strings, and woven or plaited without mechanical aid into any sized cloth that may be required.

On the 20th we crossed the Umswelisi, and ascended the densely bushed rise on its left bank. The Umswelisi is a fine clear stream, flowing over a rocky bed of porphyry and basalt. The flow of water was good, and would be sufficient to irrigate this great and fertile flat, and to turn mills; for which latter purpose its rapid fall is admirably adapted.

The path over the range on this side of the river is 1800 feet above the sea, and points on it are quite 2000 feet. The formation is still the same, and the soil red clay.

Descending 400 feet we crossed the Shinike River, also a strong, rocky stream, waist deep, and ascended the rise on the opposite side. Here we found kraals, and cultivations of bananas, gingelly, and cereal crops, all in the highest state of productiveness. Passing two more streams, we ascended to a valley-like plateau, and stopped at Makuwan's Kraal, in the Gwingi district. From this kraal, 2000 feet above the sea, three timber-clad peaks were seen to the west, called Urobi,

Sipungambili, and Silindi. Behind the latter lay Umzila's Kraal. Having sent to announce our arrival to the King, we received a message that we were to remain where we were until he was prepared to receive us. Having waited a fortnight, we sent to say that unless placed nearer to him we should return home, as we were being starved here, and he was too distant to send to about it. We were at last allowed to come on to his kraal, situated at the sources of the Umswelisi, and called Tshamatshama, or Nodwengu: Tshamatshama being its ancient and Tonga appellation, and the latter a Zulu innovation imitated from the name of the dwelling of Umpanda, the King of the Zulus.

On leaving Makuwan's we crossed one stream, and ascended the valley of another, until we neared its source under the Sipungambili Peak, and then struck across the neck 3000 feet above the sea. From this neck a fine view is obtained. The bush-covered plains, more than 2000 feet below, seemed, from their flatness and dark-blue colour, more to resemble sea than land; and the dead level of the horizon, more than 50 miles distant, added to the illusion. To the north a cloud-capped range of mountains burst upon the view, their sides appearing bare, and seamed with crevices. Apparently this range was at least 8000 or 9000 feet above the sea-level; but, as the narrative will show, I afterwards discovered that it could not be more than 5000 feet. It is a striking landmark. Behind it appear other peaks, becoming more and more misty as their distance increases. This range is the Sita Tonga, and the highest point is Shimanimani, or Sihoyia's Mountain.

The most elevated plateau was now reached by us, ranging between 3300 and 3600 feet above the sea. The formation was sandstone—red in the lower parts, resting on the igneous rocks, and white above. On descending a ravine I found a bluish and green clay shale intervening between the red sandstone and the volcanic rocks; those rocks being still of the usual phosphoritic character, red or bluish-green, with numerous little round white crystalline spots throughout their substance.

One thing that disagreeably impresses the traveller is the height and size of the grass growing on the slopes. So high, in fact, is it, that no view can ever be obtained of the country, and it forms quite an arched way, under which you pass along, opening a path with your stick and hands. The grass seeds, like javelins, descend in showers, and fill your clothes until you are nearly driven mad with the itching, and blinded as well. I thought a glass helmet would have been a useful headdress here. One cannot walk through it until 10 o'clock without getting as wet through as if you had been through a river, the dews are so heavy.

We descended 800 feet into a ravine that night to sleep at some Mandowa huts. The next morning, descending yet another 400 feet (1200 in all), we crossed a stream flowing to the right, and re-ascended the heights on the opposite side to 3600 feet above the sea; passed on, descending slightly, to the Umswelisi again, and halted within 500 or 600 yards of Umzila's Kraal on the 8th of April, 1872.

In the afternoon a number of drunken councillors came down, and gave me two goats and much insolence, saying the King could not see us until his messenger arrived with the goods. In the evening the King sent me a present of a forty-pound tusk of ivory, and to my companion three small ones. We asked where we were to sleep, but received no answer, and were left to take shelter under the canopy of heaven. Next day a messenger arrived, saying that we must return to the kraals in the hole; but this I flatly refused to do. All the other kraals about being Royal ones, we were not allowed to go to them. At last, on the matter being reported to the King, he issued instructions that we were to have the assistance of all the Tongas to build huts wherever we liked, so long as it did not overlook his palace. Accordingly we selected a spot near a running stream, and put up a hut. Here we stayed until Saturday the 22nd of June, 1872, when we moved to the King's immediate vicinity after two months and a half of waiting.

The latitude of Umzila's Kraal is 20° 23′ s., and longitude by dead reckoning 32° 30′ E.; elevation by barometer and boiling-point 3200 feet above the sea.

The long weary weeks at Tsamatshama were passed in forced idleness; for so soon as the position was fixed by observation nothing more could be done. The grass was too high for successful sport, and moreover the work was too dangerous, as the buffaloes wounded on former occasions would lie in wait for the hunter on the next.

Umzila occasionally sent over a cow or a goat; and what with fowls, Kafir corn, meal, and honey, we managed to subsist. Sometimes a buffalo would be shot, or the lions kindly provided us with part of one.

The view of the "Sita Tonga" range was so attractive that, although I knew that I should not get any guide or help from Umzila if I asked, I determined to find my way to it. Having so few Kafirs, I could only take one, who was to carry my sextant and mat. I started on the 20th of May. Following a path leading along a ridge running north, it ultimately faded to nothing, and left us the alternative of returning, or forcing our way through gigantic grass. The only means of getting along was to press the grass down first, and stand upon

it; while the sarsaparilla runners distributed throughout it several yards in length, with small hooked thorns, made it doubly difficult thus to break through. Proceeding thus for an hour we struck upon a path which apparently led to some kraals far in the valley 1500 feet below. Luckily, as we were about making the descent, we stumbled upon a Mandowa, who had been in a drunken sleep since the night before. He guided us north-west across by buffaloes' tracks, until we descended into the valley of the Umkurumatsi Stream—the same that we crossed in the deep gorge when we first passed up to the King's residence. We slept at his huts that night, and had some umgoza for supper.

Umgoza is a kind of canary-seed plant, which, though tasteless and indigestible, makes a most intoxicating beer. Before being ground into meal it is roasted to soften it, or rather make it more brittle, as I suppose. The porridge is of a deep red colour. The Tongas originally grew it solely for drinking purposes; but now that the Zulus rob them of their crops they cultivate nothing else, as it is almost uneatable, and, in fact, even to a Zulu, unpalatable. They are thus less bothered by their distinguished visitors, who would otherwise quarter themselves upon them until they had eaten up everything.

Starting next morning early, we passed upon the banks of the Bosi in a deep valley. The river is here bordered by steep precipices of sandstone and volcanic rocks; the formation along the path being a red clay slate, with eruptive porphyritic rocks. After again losing our way and wandering about, the day drew towards a close. Seeing smoke across the river, we made for it, and found some hunters feasting on a buffalo they had killed. The meat, with water from the Bosi, made a late meal. The Bosi is a strong, rocky stream, knee-deep, and 30 yards wide even here, near its source.

Next morning these men guided us to the main path to Umshadsiha's Kraal, skirting the deep precipitous gorge of the Bosi, below a deep waterfall hard by. Passing on, we struck up the east side of the Bosi towards its source, passing two or three little streams bursting from the high stony ridge on the right hand. On the left, across the Bosi, extended the bare grassy plateau, gradually rising until it overhung the valley of the Sabi, only about 25 miles to the west. This fine high plateau is totally uninhabited, though the huts still remaining testify to the recent flight of the Tonga inhabitants. Turning to the right over a neck, or rather along a ridge, taking a bend towards the north-west, the path crossed the flat, and passed along its side, with the waters now running towards the right into a large drain that skirted the foot of high hills bounding

the view eastwards. Following this valley down, and emerging on a fine plain, we came upon a stream flowing from the west through a gap in the ridge which I crossed, and emptying itself into the Bosi. I had now descended more than 1000 feet; this plain being just 2000 feet above the sea.

It immediately struck me as being admirably adapted for a township. At the back, rolling hills dipped eastwards, and a fine strong river drained it completely, and afforded a fall for water supply, for irrigation, and for mill purposes. This journey also further developed its suitability on account of its accessibility from the plains. Passing on 2 or 3 miles, and slightly ascending, we were suddenly brought into view of a stony but well-inhabited valley, with a strong stream flowing along its bottom. Descending by an easy slope, and occasionally passing a block of porphyry or serpentine, we came to the bottom amongst fertile fields of maize and sorghum. This is the Inyowtshia (or Inyahaoxo, or Inhaoxo of the Portuguese), and was formerly under an independent Queen named Mafussi, who is now subject to Umzila. Having no one with me from Umzila, I was almost refused accommodation for fear I might be running away from him. Ultimately, however, I was provided with one of their peculiar huts, built on poles about 6 feet above the ground. The inside, though small, was scrupulously clean, and the floor was of earth laid on poles and reeds. Here I had supper on Kafir-corn porridge, with a relish of ground gingelly seed. As it is difficult even for a native to swallow porridge down "neat," the sauce was the more acceptable to me. These people invariably have some relish to their farinaceous food, which they call "umtshobila," and which is more often a stewed rat than anything else. Their mode is to screw up a bit of porridge and dip it into the sauce, and then swallow it.

In Dr. Petermann's map, Inhaoxo and Mafussi are both shown, but near the sea; whereas this Mafussi and Inhaoxo (or Inyowtshia, as we should pronounce it) is at least 120 miles from Sofala. This stream or river empties itself into a larger one, which we crossed next day, and which runs into the Lusiti at no great distance ahead. The mountains called Shimanimani, which are the higher peaks of the range called Sihoyia's Mountain, formed a grand background to the scenery of each day's walk. But already I began to feel that I had over-estimated their height, as I had now descended to about 1200 feet above the sea.

Turning to the left, or north-west, into a bushy or broken country, and crossing a steep ridge, we descended to some kraals in a most picturesquely-wooded glen, with a gurgling stream splashing along its sinuous course. Here they were reaping an

early crop. I was hospitably entertained, and had a feast of thick-skinned lemons, which are found in most of the valleys of the streams running into the Lusiti. These formed the sauce to my porridge on this occasion.

While on the Lusiti we heard vague rumours of ruins existing; and these lemon-trees seem to warrant the supposition.

At Tsamatshama, or rather at the Igandi Kraal, there is a very fine lemon-tree at least fifty years old. I could ascertain nothing definite about these ruins, as directly any inquiries were made the narrators immediately ceased to discuss them, or became aware that they were talking on a forbidden topic. I think there can be but little doubt but that Mahommedan ruins of the ancient Monomatapa's people exist between this and the Gorongosi. Being in an official capacity and without attendants, I thought it best to desist from creating suspicions, with the hope of approaching the subject at some future time, when I might be better prepared.

Right under the Shimanimani, in one of the most picturesque spots that I have seen in South Africa (and I have seen most of them), I found Imboougwan's Kraal. Imboougwan is the Zulu governor of the district around Sofala, and the terror of the Portuguese. His late removal to this place has relieved the "Sofalans" from a constant tremor of fear that used to possess them. He gave me nothing to eat, and put me into a hunter's temporary shanty to sleep; I therefore arose in the morning with an unpleasing lightness about the stomach, and in no enviable temper. He came down to have a look at the Englishman, upon which I spit upon the ground (a dire insult), and called him every ill Kafir name I could think of, and walked off. He hallooed after me, "Here, white man; there are a few hippopotami in the Lusiti; they are my cattle; you must not shoot them." I replied that I would shoot every one, and marched on.

A mile from the kraal we struck the Lusiti, a fine large stream, flowing over a bed of boulders. Passing up the bank about 2 miles, we reached the confluence of the Haroni River with it; the Lusiti taking a great bend here to the left, and apparently coming through the hills in a westerly direction, and the Haroni coming from the north or north-west along the side of the Shimanimani, from whence it takes its rise. Behind the Shimanimani another great peak—Gundi-Inyanga (Shave-the-Moon) is seen. I fancy the Lusiti takes its rise in that mountain. A finer scene than the Shimanimani can scarcely be imagined.

I had now descended to between 1100 and 1200 feet above the sea. This mountain then shot up quite 3500 feet above me

in a sheer wall. I went up the Haroni Valley some distance, crossing the Lusiti and Haroni at their confluence; but seeing the gigantic precipices and confused mass of mountains and rocks, I came to the conclusion that a month's or six weeks' hard work would only make a commencement of their complete exploration. I therefore determined to leave that field for the future operations of myself, or for some more fortunate explorer. To say that this piece of country is full of interest is but expressing a tame opinion of its geographical and geological features. I consider this peculiar basin of mountains as forming the source of the Bosi, one of the most interesting problems of modern geography. By its proper exploration a knowledge will be obtained of vast regions of healthy country closely adjoining the Port of Sofala; and if taken in hand by Portugal, and offered to emigrants on some liberal scale, it would immediately abolish the native difficulty for ever in Southern Mozambique, and form a source of wealth and commercial activity to Portugal, such as she has not known since the days of those heroes who founded her colonial empire, of which only the fragments remain to her now.

If the streams descended to the plains in a direct course to the sea, it would be impossible to ascend this plateau without gigantic road-works; but these affluents of the Lusiti run north, and descend so gradually, that even railway works could be successfully carried up them as far as to Tshamatshâma and the highest points of the plateau. The Bosi breaks through the ridge more directly eastwards, and is quite inaccessible. The Umswelisi Valley may be more practicable; but I have not explored it. Artillery and transport waggons could be taken up the Lusiti and the Inyowtshia Valley with little or no difficulty. Having once ascended the plateau, the broken country is so narrow that it could be cleared by shelling from the heights.

On the 27th of May, having ascended to the foot of the Shimanimani, I slept on the banks of the Haroni River, lat. (by observation) 19° 56′ s. This can, therefore, be marked as "Erskine's furthest in 1872."

I found Imboougwan's hippopotami asleep, and had a fine shot at 20 yards; but though I hit them I did not get any. I easily made the camp again in four days from Shimanimani. Umzila's new kraal is in a bee line distant from the following places as under noted:—

From Lydenburg . .	about	345	miles.
„ Zoutpansberg .	„	174	„
„ Matabili's Kraal .	„	180	„

From Cape Town	. . about	1190	miles.
„ Durban	. . . „	580	„
„ Delagoa Bay	. . „	335	„
„ Inhambane	. . „	250	„
„ Chuluwan	. . „	140	„
„ Sofala	. . . „	125	„
„ Quilliman	. . „	300	„
„ Senna	. . . „	250	„
„ Tete	. . . „	260	„
„ Lake Ngami	. . „	680	„

The two nearest points, Sofala and Chuluwan, also afford the greatest facility of approach in every way, and with less physical difficulty than any other. The bar at Sofala is a great obstruction to the port. It must be borne in mind that all domestic animals die from some mysterious poison taken in on the bushy plains; though only a small percentage of donkeys are lost. Camels and elephants have not been tried. The low country is healthy during July, August, September, and October; so that in these months European forces could traverse them. Chuluwan is a safe and convenient harbour, and offers waterway some distance into the interior, where the country is open and free from swamps, and is altogether a very desirable "*point d'appui.*" Large running streams can be followed quite up to the mountains. Wood is sometimes too plentiful, though the denser bushes could be avoided, and the route taken through park-like country. There is no scarcity of grass, so that fodder need not be carried. In fact, a country more adapted to easy conquest by Europeans could scarcely be found; and when once on the plateau a climate superior to that of Europe prevails. The country can also be entered with transport animals from the back or west side, traversing Umziligasi's country.

Umzila has no regular army; but the Zulu or Umgoni section of his people are divided into regiments, and duly officered. They are not called out for drill at regular periods as the Zulus are, but only for action when war is threatened. The only attempt at regular movement is the arrangement of different companies into a mass, or sort of phalanx for charging purposes. They are kept compact by the indunas, or captains, making a plentiful use of the stick, which is applied to any part of the body that is open to a blow. They do not keep step, but run along like so many ants, making a somewhat similar hissing noise that large ant armies do when disturbed. Such as can afford it, are clothed in loose skins, feathers, tails of the blue gnu, and also that of domestic cattle; but the greater part

can only muster a few pieces of goat-skins to hang round the neck, the elbows, and knees.

An army of our own southern Zulus is an impressive sight, but these, their degenerate kinsmen, make a sorry figure in their war dress.

On Thursday, the 18th of July, at 8.37 A.M., an earthquake from the north-west passed by to the south-east. The ground did not shake much, but there was a loud rumbling noise. It lasted three minutes. The next morning, at 4.41 the shock was repeated. We were asked by Umzila if we caused it; I wished to say it was the growl of the Government at our waste of time, but my companion advised otherwise. I therefore replied that I knew no more about it than he did.

It would be wearisome to detail the ridiculous behaviour of these people; so I shall pass on to say that I announced my wish to return to Natal viâ Zoutpansberg, and asked for carriers. The King consented; and it was arranged that Mr. Dubois, with the ivory, should pass out viâ Inhambane and the sea route, whilst I returned by land. On further inquiry, Umzila requested that I would alter my determination to go viâ Zoutpansberg, and go by Lydenburg, on account of the great scarcity of water on the former route. I could not but consent.

On the 30th, I started for home.

In consequence of the system of carrying from kraal to kraal, it took me five days to reach Malungu's Kraal. The route I took from Umzila's passed down the "Zone" Valley, descending from the Silindi Mountain, passing down the stream until near its junction with the Shinike, sleeping the first night at Injakazan's Kraal. Next day we crossed the Shinike rivulet, and then passed over another ridge into the valley of another stream flowing down to the Umswelisi. I crossed the Umswelisi near Inyagufella's Kraal about 5 or 6 miles above my upward route, and then passed a small stream flowing to the left into the Umswelisi, and slept at Hlambula's Kraal.

Here I shot two does of a new species of hartebeeste, called nondo.

After passing over a ridge of porphyry, I crossed two small streams flowing to the right into the Umswelisi; and on the third day came upon a ridge of pebbles bordering the valley of the Sabi here at about 10 miles distant, showing that at one time either the Sabi, or an arm of the sea of great extent, rolled between these ridges. From the masses of pebbles completely rounded and water-worn, and forming hills, it would seem that nothing but the roll of the ocean could account for them.

The country, after descending the mountains, assumed its flat bushy character, with a red sandy soil.

Hitherto, my companion's notes have furnished dates; but henceforth I can only write from unassisted recollection. Up to Umzila's Kraal I laid down my route on a map, on a scale of 8 miles to an inch, which was saved when my notes were lost; but the route now depends solely on memory, and was only written in my note-books, and not mapped out. The books are lost as before remarked; necessarily the account henceforward will be less exact, and more general even than it has hitherto been, which is also less methodical and detailed than it would have been had I saved my copious journals.

On the fourth day we slept at a kraal in the bush, and on the fifth got to Malungu's. This Malungu was ordered by Umzila to furnish me an Umgoni, and to proceed himself also as far as Donduli, on the Upaluli, or Oliphant's River. He could not be found for five days; but at last turned up, and we started.

Arriving at a kraal in the evening, where we intended to sleep, we were much annoyed by the tsetse flies which abounded. Nevertheless, there were many dogs at the kraal which had been born and bred there.

Leaving next morning early, we reached the Sabi about mid-day. As the country ahead was reported to be a land of famine, I stopped to shoot some game, and bagged two water-bucks the first day, and two the next. I found the river here bordered on this side by bluff-like ridges of limestone and pebble. In many instances, only isolated hills remained to testify to the great denuding action that had formerly taken place. The bush was that called Umtshanatsi (Mapani of the Matabili), and here mostly in tall open woods. The Sabi differed little from its appearance lower down, except that perhaps there was a little less water in it; though I think even this deficiency was only apparent and not real, as the river receives no affluents of any moment between this and Sondaba's. The sandy bed was quite a mile wide, and the water about knee deep, divided into several channels, and altogether perhaps amounting to 300 feet across. A heavily-timbered island marks the spot of my crossing.

Along the valley on the north side many pools are found, which contain saline water. The natives resort from far and near to manufacture the salt. The process followed is to scoop out the muddy surface, where the efflorescence is most plentiful, dissolve it, and boil off the water until the salt only is left. It is then whiter and purer than one would expect from its rough manufacture.

I was informed that if I started early in the morning I should get to the confluence of the Lundi with the Sabi about

mid-day. I therefore judge it to be about 10 miles above this point. I remember the result of cross observation by stars north and south placed this part of the river in lat. 21° 19′ s., agreeing pretty closely with the latitude of Sondaba's lower down. I believe, however, that between these two points the river attains a still more southerly latitude, perhaps as much as 21° 25′.

The route pursued was calculated daily by traverse tables, and checked by latitude; but beyond the recollection that it did not deviate much from due south until it reached the Limpopo, I am not able now to be more exact. Occasional latitudes I recollect and shall state; but the greater part have escaped my memory. I, luckily, ran my pencil daily over a small map of Petermann's that I had with me, and thus identified some latitudes which I remember by the names marked on that map; the errors of it serving to fix some points in my recollection. This map I also lost; but the exercise of marking it fixed the points somewhat better on my memory than would otherwise have been the case.

Crossing the Sabi, I stayed another day to shoot, and killed a water-buck. I also saw sable, antelope, and impala. There was plenty of spoor of elephants, buffalos, gnus, and elands, as well as of rhinoceroses.

The right or south bank of the Sabi here is quite uninhabited, the Hlengas purposely avoiding the vicinity of water; so that the Umgonis may not make resting-places of their kraals.

On leaving the Sabi, we entered a red sandy country, covered with dense bush. It is needless to repeat again and again that the country is flat; for since crossing the Umswelisi, and leaving the mountains behind, the whole of the land is as level as the ocean, having nearly everywhere red sandy soil until the Limpopo is reached.

Leaving these people, who were living in the bush, we arrived at Mandundari's Kraal, and still passing among dense deciduous woods we passed on to Halata's Kraal. Here the dense bush ends, and alternate woods of Umtonto or Umsimbiti prevail; the Umtonto generally growing on the more white sandy soil, and the Umsimbiti invariably growing on the deepest red soil.

After leaving Halata's, we struck west for a few miles, and slept at Pagadi's Kraal; and it was not until the next day that we crossed the Umhlanganini and Mahunjo. No rock or stone was visible until we neared the Mahunjo River, after crossing the Umhlanganini. Near it a coarse red sandy sort of ironstone crops out. The Umhlanganini is totally destitute of water on the surface, though wells dug in its bed reach water of

good quality. The Mahunjo River was now reduced to a few isolated pools at long intervals; but from the mud and its general appearance I have no doubt it runs for the greater part of the year.

At the Mahunjo we stayed with people in the bush. It is the practice of the Hlengas to desert their kraals during the dry season, and seek some spot in the bush near perennial water frequented by game. They there live entirely on meat and the root of an evergreen shrub, called umtshungutsi, from which they also manufacture a drink, tasting like sugar and water. The root when used for food is pounded into a coarse meal.

Seeing none of those large wooden mortars used by the natives for the purpose of pounding their corn, or stones to grind it with, I was led to inquire how they triturated it. I was shown holes in the ground which they had artificially hardened with ant-heap earth that apparently contains so much lime and sand in its composition as to form a perfect cement. In these holes, with a pestle of umsimbiti (African iron-wood) they were enabled to pound the corn I carried into fine meal, without even filling it with grit as might be expected.

Umsimbiti now prevailed even in dense forests for a mile or two at a stretch.

Leaving these parts, we struck the Ugwegwatsi River, now only standing in pools: but found that the people had heard of our approach and had run away.

Leaving this river, I struck the Umtshefu, and found some people under Mahonti (not him of Makwakwa) in the bush. The next day, going along down the river, we passed his deserted kraals, and found Inkoman Simba also in the bush on the same river. This Inkoman Simba is the Quamba Assimba of Petermann's map. The mistake in the name occurred thus: a native on being asked where shall we sleep, would answer "Qua," or "Gwa." Man Simba, short for "Gwa Inkoman Simba," the "Qua," or "Gwa," being the word "at" or "be." Petermann's position appeared to be correct; for though I did not reach his kraal it was not far off.

Leaving this, we struck across some very open country with Umtshanatsi woods, being the head of a series of open grassy spots draining to the U'Luize river to the east, and called Mabanyin, or open country, and came to the Umgorbu River, very salt, and now standing in stagnant pools. Much limestone lined all these pools, and they glistened with the white efflorescence of soda salts. Here we found Siserki, who I believe is identical with Schiqueta of Petermann's map on the route of Santa Anna Montanha. He was living in the bush apparently

on the exact spot where Petermann's Schiqueta is; but he told me his kraal was about 30 miles to the west.

Next day I went to these people's camp, and on the next following made a long march to a well near a deserted kraal. We were forced to go on next morning to Inyantshytshy's Kraal. The bush was still Umtonto and Umsimbiti. Inyantshytshy gave me a small tusk. Of course I returned him suitable presents. Leaving this, we slept at Inyarigormi's Kraal, where they were "waking" over the death of a young man just killed by a buffalo. Next day we passed through Umtshanatsi woods and found the dry torrent beds dipping to the west, towards the Limpopo, all the minor rivers hitherto crossed draining south-eastwards and ultimately forming the U'Luize river marked by Petermann. We again slept at a kraal, and next day soon after starting came to the commencement of an ancient bed of the Limpopo, as was shown by masses of water-worn pebbles. The bush or forest was now very tall and open, and the descent quite perceptible. About mid-day we reached the edge of the rises that border the river-bed, and saw stretched out below us the open grassy valley, the heavy evergreen timber skirting the stream and the river itself. A considerable rise was visible beyond it to the right, and to the left down its course on this side was another high landmark, with almost precipitous sides of recent red stone, covered with Umsimbiti bush.

On entering the evergreens bordering the river, we found people engaged in collecting a cherry-like fruit called "Inhlanspha", which drops from these trees when ripe. It has a sweet mealy taste, and contains two long seeds. The natives dry them in the sun, after squeezing out the seeds, and then pound the fleshy parts into meal, which is made into porridge or drink; very palatable. As the fruit whilst drying gets fly-blown, it is about as full of maggots as rice soup is of rice. If the skins of the uncooked fruit are eaten in any quantity, violent attacks of windy colic ensue. I suffered terribly from it. On cooking the fruit in the ashes and carefully rejecting the skins I found no ill results. Another fruit also found along the rivers and growing on a large tree, called Umtorma, is also eaten and is very refreshing, tasting like fruit jelly. During the season of these fruits the natives eat nothing else, so as to save their corn. Those natives who live away from the river resort to it from great distances to collect these fruits.

We crossed the river to some kraals. It is about a mile wide, but mostly sand, the water being confined to about 300 feet broad and 2 feet deep. This place is called Matsambu, after the Tonga chief thereof, and is a well-known locality.

For the information of sportsmen I will add that it is the beginning of the game country. Even at the kraal good sport is to be had. Hippopotami are in the river. Giraffes, elands, koodoos, sassabyes, zebras, wild-pigs, gnus, and rhinoceroses are found in the adjoining bush. A few miles below the kraal they literally swarm. Nowhere in this part of Africa have I seen so much game. Game in Africa is not universally distributed. It is only found in localities perhaps accidentally discovered, as this place was by me.

Elephants also drink at the river, and if followed up energetically are sure to be found. The Tabi or Lehlaba, an affluent of the Upaluli, is about the southern limit of this game country. I shot a sassabye, a zebra, and a waterbuck, and wounded several gnus, sassabyes, and zebras. Impala, rooibucks or pallahs, abound in troops, but (as is usual with this kind) are exceedingly wild. One may often come upon them unawares, and thus procure them, but if they once see you pursuit is useless. There are no great physical obstacles to overcome in getting here from Lydenburg. Doubtless now that the Zulu country is shot out this will become the favourite resort of English sportsmen. With some difficulty we procured some corn here. Next day on my way I shot a waterbuck, and could have bagged several head of game had my ammunition not been so scant. We made a good march, and put up at some deserted kraals on the bank of the river.

At Matsambu I first began to suspect an error in my former determination of the latitude of "the meeting of the waters" of the Upaluli and Limpopo, called Mahlangini by the natives. For I found Matsambu by cross star observation to be in lat. 23° 27′ s., and therefore as the former point was formerly determined to be 23° 34′ the river must either take a great easterly course or the latitude of the confluence be in error; in passing along it was found to flow nearly due south, and intermediate latitude confirmed my opinion that an error of the original position of the meeting of the waters must exist to a considerable extent.

Leaving Matsambu, we made a good march, but found no people along the river, and therefore put up in the bush. In the early morning many of the Insimangu monkeys were discovered in the trees. Taking my rifle I made a capital shot and knocked one over. The next day, crossing the river just below a conspicuous red sandy rise, we soon reached a kraal. We now slept nightly at kraals, and found the country well inhabited. On the fifth day after leaving Matsambu I came upon a pool deep enough for hippopotami, and found some.

We stayed a day here to shoot. On the next day an easy walk brought us to "the meeting of the waters." Here my latitude observation by the sun gave 24° 8′ S., and the check by two stars north and south confirmed it. My 1868 determination is evidently, therefore, erroneous, being lat. 23° 34′ S., that is to say, this point is 34 miles more to the south than I formerly placed it. I find that an error in the reading of the entry in my journal fully accounts for it, as I took "overlapping rising" to mean the lower instead of the upper limb; making the necessary correction they both agree perfectly. The former determination depended upon a meridian altitude of the sun repeated next day, in which a similar error of reading occurred. This error is fully established by three separate and distinct observations now in 1872; one by the meridian altitude of the sun, one by the meridian altitude of the star south, one by the meridian altitude of the star north. Moreover, daily determinations along the Upaluli, being lat. 23° 57′, 24°, 23° 55′ S., and the Ulongwi hills in 23° 56′, place this point beyond further doubt, and demonstrate that I made a considerable error in my former determinations: though the observation is entered in my printed 1868 journal, it was calculated improperly. All my other 1868 determinations were confirmed by subsequent observations in 1871 and 1872; this one alone showing any error. This demonstrates the necessity for a traveller using cross stellar latitudes in preference to single solar ones. Moreover, the dreadful heat and glare at mid-day on land almost forbids the traveller using the sun. The inconvenience of the delay at mid-day for the solar observation also argues against it. I stayed at the meeting of the waters a whole day purposely to establish this fact. I placed its former longitude by dead reckoning in 33° 42′, which depended on Lydenburg being in long. 31° 30′ E. In my present journey I have moved it to 33° 2 —′. I believe that that town is more westerly in long. 30° 37′ E., so (by Petermann's last map it is removed to long. 30° 44′ E.) that this longitude would undergo a similar movement westward together with Mauch's, and my routes, and also the confluence of other important rivers, such as the Limvubu, Inwinisi (Nuanetsi), &c., &c. I suspect even the present, 1872, longitude of Schoemansdal to be too easterly. It depends simply on Mauch's usual method of dead reckoning carried up from Potchefstroom, or Pretoria. These longitudes sadly require to be fixed, but I had not the necessary instruments, or even practical experience, or dexterity sufficient to do it.*

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* See Appendix.

I have formerly described the richness of the land at this place, which, indeed, is universally the case in the alluvial valley of the Limpopo. The limestone and pebble rises that border the Sabi are again found here; and our next day's march up the river discovered them in greater proportions as to height and more pebbly in composition; in fact, hills of pebbles, the stones being generally larger than a turkey's egg. I found no real granite amongst them. Quartz, gneiss, eurite, porphyry, and basalt were their main components. The country became now slightly undulating, though still bushy. Away from the river Umtshanatsi (Mopani) woods prevailed; but along the river minosas and some evergreens are found.

On the third day after leaving the meeting of the waters, we arrived at Donduli, which is really only two easy days' walk distant from that point. The country on the north of the Upaluli, and from Matsambu downwards, is inhabited by the Baloia.

The Chief of Donduli, Sifumbata, was the man who had to furnish me with bearers to go to Natal; but, as I formerly stated, Mahungu having turned back, we anticipated some difficulty. Sifumbata said he would discuss the matter. After talking three days, he came to the conclusion that I should have the men. On starting, though, we found all the kraals deserted, the people having run off to avoid this levy. We went along slowly, picking up one man here and another there. Coming to our resting-place, we found it like a cattle-kraal, from the great herds of buffaloes found there. My hunters shot one. Next day we made Sifumbata's induna, or secretary's kraal, and here procured all but two of our complement of bearers. Next morning we started, crossed the Upaluli, now bordered by rocky hills of rounded pebbles, and occasionally precipitous porphyritic rocks; and recrossed again. Here is, perhaps, the last considerable rocky hill on the river. It is covered with Umsimbiti bush; I have christened it "Reeves' Mount," as my unfortunate friend Reeves turned back here in 1868, and thence sent me some of the luxuries of civilization. He afterwards (in 1870) near Zoutpansberg met with his death by a gun accident.

We slept at Mahungu's Upaluli Kraal that night, and found the Dondulans feasting on crocodile, which they catch by baiting a stick tied in the centre. The crocodile gulps the whole, and on the string being pulled the stick strands across his entrails or gullet, and he is captured. Here my hunter shot another buffalo. The country was now becoming quite broken and stony, and the banks of the river were bordered by precipitous rocks. Open deciduous woods still prevailed.

The limestone bluffs hitherto skirting the river below Mahungu's now ceased, and the country became stony and undulating, or even hilly. As I can now be precise by having my note-book from this date, it may be as well to state that I left Mahungu's Kraal on Sunday, September 15th, and crossed the Upaluli to the left bank. The bed is here about a mile and a half across, but the stream of water was not more than 80 yards broad and about 2½ feet deep. When I describe the depth of these African rivers, it must not be understood to be that depth all through; but generally in some narrow channel, usually tortuous in the extreme, and often entirely barred by sand to within a few inches of the surface. The bed of this river is here pebbly, with sand. On either hand are low bushy hills, and on the north, or left bank, a small extent of red precipitous porphyritic rock, called jingivin, which forms an upland mark on the river. Striking slightly away from the river, we ascended the hills, which proved to be about 300 feet above it. They are apparently entirely composed of water-worn pebbles. In some places these pebbles are so assorted in size, and so evenly and thickly spread over the surface, that it might be supposed they had been laid out by art and not by nature. The prevailing precipitous rocks along the river, and the occasional outcrops along the route, appear to be composed of porphyry, showing that the pebbles are merely a superficial deposit torn from the neighbouring rocks, and rolled and triturated by a vast ocean. These pebbles are usually of the prevailing rock, but many are of gneiss, basalt, quartz, and different varieties of porphyry. Granitic pebbles alone seemed wanting. On ascending to the higher ground and plateaux, the pebbles give place to angular fragments of clinkstone porphyry, generally of one size, about a foot square, and usually oblong. The walking then was extremely disagreeable, and even more so than over the pebbles. Passing on, we began to descend to the Tabi River, and found the rocks still larger and more angular, and consequently the labour of walking increased. Though a much-travelled path was pursued throughout, this did not much mitigate the evil. About 8 miles on a large outcrop of this porphyritic rock was reached, in the hollows of which good water was found, which is permanent. The rocks are called Matabin. After passing this place, the path crossed a very flat country, with Umtshanatsi woods and grass, and descended by a very rocky path to a dry torrent-bed, called Munuwin (brackish), which had a little stagnant water in the hollows. On the right hand were some conspicuous rocky hills, called U'Longwi, whence this torrent takes its rise about 4 miles off. The path, then taking a southerly direction, led

over a stony rise and turned back towards the right, descending to the Tabi River, which was now in sight, and appeared to be a vast bed of green reeds. This Tabi River is also called Lehlaba by the Basutos, or Mavithas further up. A path skirting the river was struck, and pursued up until it passed up under the high precipitous sides of the U'Longwi rocks which overhang the river; and on emerging into the more open country, turned sharply to the right, and ascended the hill over the rocks. A short, sharp climb brought us to the kraal of Sisani Mashali, a Mavitha or Basuto, almost on the top. It was, by the barometer, 300 feet above the river, and gave a fine view of it and of the surrounding country, laid out like a map below. The surface appeared of a red colour from the dry grass, and was dotted with stones and bush, but flat. To the north-west, three isolated hills were visible, called Igotsi, Itshali, and Kaleka. The Tabi flows under them. They are distant about 30 miles. The view from the top of the hills, which are still about 100 feet above the kraals, 1100 feet above the sea, and 400 above the plain, comprised three-quarters of the horizon, which appears almost as level as that of the ocean. To the west, the country appears more undulating, and in the extreme distance a small elevation denotes the Drakensberg near the Mallatsi River, and the point where I descended those mountains in 1868. The Tabi supplies about one-third of the water of the Upaluli, and is a strong, rapid, rocky stream, rising in the country called Spelunken by the Boers, being the easterly face of the Drakensberg, near Schoemansdal.

This Basuto Kraal is the only one for many days' walk around this spot.

Up the river towards the Berg there are no people for five days' walk; and towards the north-west, four.

On the latter route are the people of Umjaji, a Basuto Chief, tributary to Umzila. Adjoining him to the west is Majaji, the Basuto Queen, of whom I wrote in my 1868 journal. To the east, about a day and a half's walk, is Imbonduna's place. On my 1868 route, farther southwards, about eight days' walk, is Delagoa Bay and Lorenzo Marques. The country has been depopulated by Umzila's armies, and such Basutos as live in it conceal themselves amongst the precipitous rocks in these peculiar hills rising so abruptly from the plain. Due west from this is a low isolated hill distant 15 miles, called Lowuli, a good landmark. During the day we passed the spoor of buffaloes and rhinoceroses, and saw impalas, quaggas, elands, and giraffes. On the 17th of September we left Sisani's and crossed the Tabi, finding it waist deep, rapid, and about 40 yards wide. By native accounts, the confluence of the Tabi and the Upaluli

bears from this kraal south, 50° E., distant 8 miles. We struck south-west to cut the Upaluli.

We made a move on the 19th, though the weather was threatening. We passed Timba Mati, and forded a streamlet just above it. Clambering over the rocks, we encamped just beyond them.

We crossed several dry torrent beds, and next day we crossed the affluence of the Imbabati River, which has the same sandy character as it has above where I crossed it in 1868. The country near the river was very rocky, with hills bordering it on either hand. Large quartz reefs and basaltic dykes broke up the stream into rapids and islands. In many places the route passing along the river wound round large masses of igneous rocks, consisting of quartz and a kind of quartzose conglomerate of mica. In many instances this latter rock was entirely black, and would answer to the German term schwarzglimmer. Gneiss and mica schist abounded.

On the 20th, at 7 miles on the stage, a pair of huge rocks in the river were passed, looking like elephants drinking. I have called them "Elephant Rocks." These rocks are at the foot of a long series of swift rapids, about 3 miles long. At the bend of them, on the left bank, is a well-marked hill having a solitary round rock resting on its crest; this I have named "Rawlinson's Cap," after the President of our Geographical Society. The river above is less rapid and broken, but still contains masses of rock and broken water. The rocks here are entirely quartzose. The river henceforward is a broken and rocky torrent; so that it is not necessary to repeat the description. It is quite impassable for any beast of burden, and altogether impracticable as a road. The country on either hand, 5 or 6 miles from the river, is flat and unobstructed by rocks, with open deciduous bush, and practicable for a vehicle.

We now saw the peaks of the Drakensberg to the south-west quite plainly. The banks of the river were now so precipitous that we had some difficulty in finding a suitable place for our camp. Ultimately, we settled down in the dry bed of a torrent.

The lions collected around us during the night, and kept up deafening roars. I stayed here next day to dry the skin of a lion which I had shot. Latitude by *a* Aquilæ on Meridian, 24° 6′ s.

On the 22nd we struck across a ridge that faced the river towards the north, and found a rocky, bushy country, with much quartz. The river is now reduced to a mere mountain stream, with many tree-stumps and debacles.

An hour after starting we passed over the Sorghobili River of my 1868 journey, here standing in pools amongst the rocks, but higher up the water is entirely hidden by sand, and only to be had by digging. The route taken kept about 2 miles from the river bank in the early part of the day, and at about 4 miles upon it we passed a solitary hill of solid quartz with an evergreen tree growing on the summit; a good landmark. I called it "Hoar Head," from its remarkable appearance. Ahead Mashishimani's hills were seen, a precipitous rocky ridge running out from the Drakensberg, and apparently turning the Upaluli westwards. Finding the country becoming more rugged and broken we preferred to return to the river. Accordingly we struck down a stream leading to the Upaluli again.

We passed the deserted kraals of Sumbani, and after passing through a precipitous gorge, here confining the river, and crossing a small perennial stream, we put up for the night. Lat. 24° 6′ s., by cross observation of *a* Aquilæ and *a* Pavonis.

On the 23rd, immediately at starting we crossed the Umgoshomera River, the Umtasera or Umtasiti of my 1868 journey, and found some limestone capping the rocks along its banks. It is a strong stream with a sandy bed, and rocks occasionally obstructing its passage. We then struck across some quartzose hills, to avoid the broken and precipitous rocks along the river which is here overhung on the northern bank by the lofty needle-like peak of Umhulula, an offshoot of Mashishimani's mountains, rising 900 feet sheer out of the river, and a most conspicuous landmark. The summit is about 1500 feet above the sea. It is crowned by points of bare rock, and stands exactly at the confluence of the Schalata and Upaluli. This range of Mashishimani's appears to run out from the Drakensberg skirting the north bank of the river, and terminating gradually in isolated peaks until lost below the horizon to the N.N.E. Ahead is a hog-backed broken ridge of the same range, and away northwards Mapalora's lofty peak was seen. Umhulula has two smaller companions adjoining it on the banks of the river.

Having again approached the stream, we re-entered amongst the precipitous rocks, finding signs of habitations, and soon afterwards some deserted kraals. We met a man at last, who guided us to some Basutos living amongst the rocks. He first, however, took us up a high rocky hill, so as to expose us to the view of all around—that they could prepare if necessary, should we be enemies. We passed under high precipitous rocky hills on the north bank with an immense mass of isolated rock separated from them, doubtless by the fierce action of this

torrent-like river extended over ages. This is called Myaki (the gate). Crossing the river here, we found the Basuto huts of Makati; lat. 24° 4′ s., by cross observation by the stars, *a* Aquilæ, and *a* Pavonis. There were some other Basutos here smelting iron; and from them I ascertained that this is a very celebrated place, and that they had come all the way from Majajis to get their iron, on account of its superior quality. The country is interesting from its peculiar appearance; being broken in all directions by these singular isolated peaks.

Near these kraals there is a path, but since leaving the Tabi there had been none; and now, on the 24th, soon after leaving these kraals, it faded away again. As rocky hills abut on the river, it was difficult walking. Sometimes there was firm ground above the river, at other times it was necessary to go along the sand of the river-bed, or to climb over the débris of the rocky precipices. The walking was thus very trying and disagreeable. Moreover, the river being so tortuous, and the rate of progress from time to time so unequal, the dead reckoning was quite thrown out.

On the 25th, as the Upaluli appeared to turn by a great bend from the northwards, I determined to strike straight for the Cañon of the Mallatsi, or Umchlasi, and the "Giant Stairs" of my 1868 route, now in view to the south-west. Telling my men, therefore, to desert the path along the river, as it was bad and stony, and make for the lofty peaks of the Drakensberg, I left them behind and went across the hills with the hunter and his boy. After leaving the Upaluli to the right, the country became more flat and less stony, and at last resolved itself into long undulations with Umgana trees and grass. The formation was quartzose, with coarse sandstone and occasional outcrops of basalt. At 17 miles distance we crossed the Umtlabi stream, which is that marked at Imperani's Kraal on my 1868 route; and at 19 miles, and about half-past 2 in the afternoon, we reached the Mallatsi, or Umchlasi River. Both these streams had trappean beds.

The other Kafirs never came on. Therefore bedding, utensils, and clothing were deficient; they did not catch me up until I had been in Lydenburg for several days.

On the 26th, thinking my men might come up, we made a short march to the foot of the precipice of the Drakensberg and found some Basuto huts, where we slept.

The barometer, since leaving the Limpopo, showed a gradual and steady decline, greater or less of course, according to the nature of the ascent, and now, at the Umchlasi River, read 28·8 inches, equal to an altitude of 1441 feet above the sea, as my aneroid at the sea level has a mean reading of 30·35 inches

(barometer reduced for error from 30 inches would be 28·45). From the hills a fine view of the country traversed was obtained. Near us, to the north-west, a range of high hills on the left bank of the Upaluli appeared to continue in a line of isolated peaks upwards to the Drakensberg. This is the Mashishimani Range. Beyond, northwards, it was seen to continue to Umhulula, together with its companion and Mapalora's mountain. The Inyaki Hills and lower ranges seem to take a more easterly direction, until in the blue distance of the horizon they seemed to join U'Longwi and the Bomba Mountains. In front, in the course of the Upaluli in the Drakensberg, a long saddle-back mountain appeared, and the course of the Mallatsi was well marked by a huge bluff on the west, and apparently a large isolated mountainous buttress on the east. This apparently isolated buttress of the Drakensberg is not really so; but forms the great elbow where that range takes its westerly bend; and forms the basin of the Upaluli and Limpopo. It is called Ufangi.

Between these two peaks the Mallatsi flows, and affords a panoramic view of mountains piled on mountains until closed in the blue distance by those near Origstadt.

We ascended the mountain by the Inyamitsi Pass, and found it better than the "Giant Stair," though also impracticable for beasts of burden. I ascertained afterwards that, still more to the west, there was a road traversible by waggons down to the plains. From the top of the berg a most extensive view is obtained, as it is roundly 3350 feet above the Mallatsi River, the barometer on the top reading 25·5 (reading sea level 30·35), therefore this pass ascends to 4785 feet above the sea. Many of the peaks were 400 or 500 feet higher, so that this part of the Drakensberg seems to be no lower than its more southern extension in Natal, but there it descends in gradual steps to the sea; here it drops in one clean precipice to the plain, which has a gradual dip, quite imperceptible to the senses, to the ocean. The path was so faint that we lost it amongst the rocks. Following down a stream until it became impassable from rocks, we crossed and ascended to a fine piece of table-land hemmed in by mountains. We then found a path with foot-prints. We followed this for a short distance, but found it going down into a fearful chasm, and striking away towards the north-east. Telling my men that Lydenburg was to the south, and that I had no desire to go to Delagoa Bay, I turned back and struck across country south. I was soon rewarded by coming on waggon tracks. Next morning we crossed the Umchlasingwana six times, and reached Scoeman's at "Kruger's Post."

Next day being Sunday, the 29th of September, 1872, six hours' walk brought me to Lydenburg, where I was hospitably entertained by my old friend Thomas Maclachlan.

The valley of the Umchlasingwana is very rich, and grows wheat and all other cereals as well as fruit to perfection. The formation is red clay slate with sandstone and eruptive basalt. Lime is found and prepared by the white people near Origstadt. There is iron ore and slight outcrops of quartz. The valley begins at Scoeman's, where the Umchlasingwana rises and is enclosed on either hand by precipitous mountains, which gradually close and form a gorge or cañon narrowing down the river until they abut upon the water. The river then escapes into the Umchlasi, or Mallatsi, to the right, which also passes through a deep cañon into the plains below. After passing Scoeman's, you ascend a ridge and come upon the drainage of the Lydenburg plateau, the first stream being the Speckboom River, which falls into the Dorp River, which, nearer its sources, waters the town of Lydenburg. The combined streams flow into the Steelpoort River, which is hidden behind the high mountain ridge called Steenkamp's Berg to the west. The Steelpoort then joins the Oliphant or Upaluli amongst the mountains.

APPENDIX A.

Ancient Travels.

No doubt search amongst the Portuguese annals would disclose some very valuable information about this country, now called Gasa, according to the Zulu fashion of christening countries after the grandfathers or great-grandfathers of the reigning King.

I was shown by Mr. Phipson, of Pietermaritzburg, a copy of Pinkerton's work, 'Voyages and Travels—Africa,' published in 1814; containing a translation of the travels of the Rev. Father De Santos, a Dominican monk, in the regions about what he calls the River of Sofala; this river is the Bosi of the present, not the Sabi River. The account is somewhat confused as to dates, but treats of periods about the years A.D. 1560 or 1570, not in 1506 A.D., as stated in the narrative.

The expression the River of Sofala is indefinite, inasmuch as there is no river of importance entering the harbour of Sofala, though the Bosi enters the sea about eight or nine miles to the north-east of Sofala in a large bay or arm of the sea. I have considered the text with respect to which of the two larger rivers in this region is likely to be the river referred to, whether the great Sabi or the Bosi, and am led by reference to the nature of the country and the mention of certain known localities to adopt the Bosi as the River of Sofala.

The Gorongosi River marked by Petermann as entering at Sofala, enters the sea considerably lower down at a deserted Moor settlement in lat. 20° 27′ s. (nearly).

The Portuguese army, which was to be sent into this country under

Francisco Baretto, apparently arrived at Mozambique in August, 1586 (1506 in the work ?), and probably landed at Sofala in the early part of 1587.

At present the coast is divided along the sea-board into South, South-east, and East Africa; or otherwise, into South Africa, Mozambique, and Muscat. Apparently in those days they classed it more generally as Eastern Ethiopia from the Cape of Good Hope to the Red Sea.

Sofala is described as a small maritime kingdom dependent on the Sovereign of Quitera, and was situate between the river Cuama (Zambesi) and Mount Manica, about lat. 20½° s. It extended along the sea-board to a river a league in breadth, which flowed through a country called Mocarangua, by Zimboe, the capital and residence of the Quiteva. This river, a league in breadth near the sea, was evidently the Bosi, which empties itself into a very large estuary. The Sabi is narrow at the mouth.

Now, in the country drained by the Bosi, between lat. 18° and 20½° s., there is a country or a tribe still called Tebi or Tevi, in the plural, Abatevi. The country might be referred to as Gwa-Tevi or Quitevi, that is "at" or "in" Tevi.

This would point to Zimboe being situate on an affluent of the Bosi, not on those of the Sabi, as pointed out by Herr Mauch.

Great commerce apparently took place between Sofala and Manica for gold-dust, which, however, the Rev. Father quaintly says, "is not so easily obtained as is imagined." And further: "When they saw what toil was requisite for extracting the precious metal from the bowels of the earth, and the danger incurred by those who worked in the mines, they were speedily undeceived, and no longer regarded their fortunes as instantaneously made. At the same time they were induced to reflect that the labour and risk of digging the gold from abysses from whence it is drawn are such as with justice to stamp that value on it which it bears from its consequent rarity." This passage is borne out entirely by native report, which says that in that country there are great holes in the ground which are so deep that the darkness therein necessitates a torch to be used in their exploration. Within very recent periods these mines were worked by the natives, even after C'naba of Umsan destroyed the Portuguese settlements at Manica, until Umzila, to obliterate all knowledge of them, killed every aboriginal inhabitant. The country is now depopulated.

The rivers in Manica—I was told by natives who had been there—run toward the Zambesi, which they call Inyantsha, or Umvula Imbomvu.

Sofala is described as then of considerable importance, and possessing a stone fort of a square shape. The site of this ancient fort can still be found near the present town of Sofala.

Pedro de Naya sailed to Sofala with six ships. Four only of these ships were able to enter the harbour, the other two being of too great draft of water. This would show that the harbour has not much decreased in depth since that time, although it is stated to the contrary by the present inhabitants. Probably the channels shift from time to time.

Sofala was then governed by a Moorish Sovereign, called Ruffe, or Russi. I think this is meant for Fussi, as there is at present a chieftainess in Inyowtshia, called Fossi, or Mafussi, a celebrated rain-maker, and once was queen of a large territory extending even down to Sofala. I visited this lady, as I have mentioned in my Journal.

It is mentioned that Sofala was very fertile, and produced abundance of fruits, flowers, and cattle; moreover, that fifteen fowls could be purchased for 11*d.* It is very fertile, but cattle are few, and five fowls only can now be bought for that sum.

He describes beer-making, which he calls wine, out of millet and rice, just as seen at present. Also the manufacture of oil—he calls it butter—from

gergelines; doubtless he means gingelly seed, from which they now extract it. They also use the ground-nut for this purpose when required for cooking; but when they want grease for the purpose of greasing their bodies, they use the seed of the Umkooslu, an evergreen tree like a chestnut.

He mentions also palm-wine. At present the natives extract a toddy from the vegetable ivory palm, called bushem.

He notices that the natives dip their food into their wine as he calls it. I have observed the natives dip their food into a kind of sauce, called Umtshobila, as often prepared from rats as anything else by the Tongas;—this custom is not practised by the Kafirs of the south.

Many of their ancient customs, as described in the narrative, resemble those practised by the Zulus and their offshoots at the present day.

It is a Zulu custom, for instance, to employ Court flatterers to shout the praises of Royalty, such as: "Here comes the great lion;" "The jackal of Manukuza;" "A huge elephant, that eats the tops of the trees;" "The great black one," &c., &c.; just as described in the old narrative.

The Zulus still address their Sovereign in a bent attitude and with bated breath, similar to the manner of the Quitevan Court. He describes the King holding levées, and the customary distribution of beer after them. Umzila, though an emigrant from the south, together with other Zulus, follow this practice.

It was customary for the King of Quiteva to hold saturnalia, or a wake for the souls of his departed ancestors, at the first new moon of September. It is a Zulu custom to hold an annual dance about the first new moon of December: it is called U'clui. Moreover, military, or full-dress manœuvres, are described at this dance very similar to those indulged in at present at the U'clui.

It is an almost universal native custom to "wake," or cry for the dead at present, as they apparently did in those days; and sacrifices to the spirits of forefathers, called "Tete Mahlosi," are likewise presented.

Many of the customs mentioned by him do not pertain to the Zulus of the present day, but are all represented by one or other of the Tonga tribes inhabiting the country. For instance, it is an entirely Tonga custom to permit the chiefs cohabiting with their sisters and daughters. I believe it is very common amongst the Chobi tribe. The rules of succession to the chieftainship more resemble those followed by the Tongas than by the Zulus. Most Tonga tribes seem to prefer female Sovereigns. Zulu succession is regulated by the King himself, inasmuch as he appoints such of his children as he may choose to succeed him.

The chiefs were then supposed, as they are at present, to be able to converse with departed spirits both of men and beast. At the present day, native hunters and traders believe that if they quarrel with the chief of the district he can forewarn by means of the departed spirits men and animals to your disadvantage.

He describes presents being made to the Quiteva to obtain rain, or to cause it to cease. This is practised at present; even the conqueror Umzila sends payment for rain-making to any of the Tonga chiefs celebrated in this line. These rain-makers appear to be hereditary, as Mafussi.

Apparently, Zimboe was near to Sofala, and beyond the usual residence of the Quiteva. Mauch places it in lat. 20° 14′ s., nearly in the parallel of Sofala, but on the Tokwe, an affluent of the Sabi. I think it must be on an affluent of the Bosi.

He notices that people sent on the King's services levied black mail wherever they went. It is curious that Umzila's Zulus are proverbial for the same propensity, differing in this respect from the southern Zulus, who merely take the tribute due from one chief to the other.

When the Quiteva ordered an execution, the executioners called out "In-

hama, Inhama" (pronounced Inyama, Inyama), as they would now-a-days, meaning Black, that is, "The Great Black One," their manner of thanking—which is usual when the King administers punishment.

He describes the disputants in a case submitting to the ordeal of poison, just as practised at present by the Tongas. The guilty party falling dead and the other escaping.

He mentions that the Quiteva granted the island of Maroopa to Rodriguez Lopo. This would identify the river of Sofala, the Sabi having no island of importance in its course; I do not know whether the Bosi has.

The systems of hunting and ensnaring game do not appear to have altered since that time.

He notices the practice of casting chances, and prognosticating the future by round pieces of wood with a hole in the centre. This is still done, these pieces of wood being the half-shells of a kind of almond which is peculiar to the bush of these plains. Sometimes, together with these almond-shells, they have a piece of tortoise-shell, and some sea-shells, which have certain definitions according to the manner in which they fall after being shaken together in the hands and thrown down.

He refers to a peculiar fish, which he calls a mermaid, or woman-fish with breasts. There is some foundation for this fact, as a kind of manatee is sometimes washed up on the coast of a very peculiar form; I have not seen it myself. Marsh fishes are also described, apparently of the Silurus species, so common in the country. He sometimes deals in the marvellous, after the manner of these ancient travellers. He states, on the failure of moisture these fishes devour themselves. It evidently did not occur to him who would then digest the meal.

He mentions that Quiteva was the King of Sofala, as Monomatapa was of Mongas. These were not their names but their titles, similar to the Pharaohs.

Mongas was rich in gold and silver mines, in pursuit of the discovery of which the Portuguese General Francisco Baretto entered the kingdom. It appears that it was necessary to pass through the kingdom of Sofala under the Quiteva to get to Manica under the Chichanga (Shishanga), where the gold lay.

These kings appear to have been Moors of the Mahommedan persuasion.

Mongas can be identified as situated somewhere near the Lapata Mountains, which in the narrative is referred to as the forest of Lapata. It says the river Zambesi, beating with violence against these rocks, in lapse of time has wrought itself a passage through the forest, and rushes with such violence over its craggy bed that all who hitherto have had the temerity to attempt its course have been shipwrecked.

He mentions the water at Fort Tete, on the Zambesi, six score leagues from the sea (360 miles), as being salt; we know this is not so.

The open country is constantly referred to, and the fact of the natives abandoning it for the bush when attacked by the Portuguese. There can be little doubt that these operations took place on the open plateau lands, where little bush is found.

Moreover, it shows that Baretto made considerable advance into the interior, even considerably beyond the sources of the Sabi. There is no mention made of his troops suffering from the fevers of the country which prevail at present on the plains; this would also go to prove that he confined himself to the healthly uplands.

Baretto left a garrison of 200 men apparently in the kingdom of Mongas, and on the open elevated country they strongly fortified and entrenched themselves; they were afterwards led into an ambush and destroyed.

It is my opinion that the ruins which Mauch discovered, and seems to think are the ancient Zimboe, is really nothing but this old fort of Francisco Baretto.

Zimboe was probably merely a grass palace, it was destroyed by the Portuguese about 1590.

Such parts of the Rev. Father's account as are given on his own observation are such accurate descriptions of the present state of things, that they are stamped with truth, though those parts given on the authority of others are as apparently misleading and ridiculous. I am led to believe that some of the people described in this narrative are the ancestors of our Zulus; most probably they emigrated southwards after their defeat by Baretto. It has often been surmised that the Zulus have Arab blood in them, hence it might be accounted for.

I see Dr. Petermann endeavours to make out that Sabi and Sheba are probably synonymous, and that the Scriptural queen was Queen of Sabi, or Sheba; or, in other words, Queen of the Sabi River. Not at all probable I think.

There is a tribe or class of Zulus whose "sobonga," or family name, is Sheba.* It is possible that they came from the country under discussion, so that there might be some ground for connecting these regions with those ruled over by Solomon's visitor.

It is more probable that the gold was taken by the Moors to Zanzibar, and there traded away. It afterwards found its way up the Red Sea.

I cannot see any ground for changing Sofala into Sophyra or Ophir.

APPENDIX B.

Remarks on Captain ELTON'S *Journey on the Limpopo River.*

The 'Journal,' Vol. 42, of the Royal Geographical Society contains a paper on the middle course of the Limpopo River by Captain Elton. It is necessary that I should make a few remarks upon it.

Much of the information given in the latter part is from hearsay, and not from actual observation, consequently it is in many instances incorrect. His remarks in a foot-note would lead one to suppose that the natives can as effectually resist the Boers, or emigrant Dutch farmers from the Cape and Natal, as they can the Portuguese. Such is not the case. The natives never have and never can for a moment withstand the onward movement of the Dutch Republics. The Boers are universally regarded by the natives as a great and powerful people. Their aggressive tendency in search of new lands causes them to be feared and disliked. Even Umzila fears the Boers more than the English.

It is the custom in Umzila's country for one tusk of the elephant killed by a hunter to be left for the King. It originated with the Portuguese; and though the Boers are obliged to submit to it, it is not from any fear but merely from custom. In Umzila's country the elephant grounds are strictly preserved. The shooting must be purchased from the King.

In another foot-note it is remarked that the Mindongas, or Chobis, extend to the mouth of the Limpopo. Such is not the case. The mouth of the Limpopo, and 20 miles to the north, or rather east of it, is under the dominion of Umzila, and inhabited by his people.

The Mindongas, or Chobis, have no head chief, as I have described in my Journal, though Captain Elton calls him Inhamtumbu (pronounced Inyamtumbu). If such a person exists, he is probably merely the head of a large

* So I am informed by Mr. Robert Dubois.

stockaded village. The Chobis, with few exceptions, pay tribute to the Portuguese.

The information given with reference to Umzila's family is entirely incorrect. Umzila is sole King. Madumelan was his cousin and subject; he is now dead. Moreover, Madumelan was not the governor of the whole of the land between the Limpopo and the Umkomogazi (King George's River). He had separate districts in different parts of the country, but none so low down as the Umkomogazi. He certainly was a great sub-chief and military commander.

As I have already stated in my Journal, after a third inspection of the river, I entirely disagree with Captain Elton as to its navigability in "the driest season of the year." I found only about 1 foot of water at Matsambu in lat. 23° 27′ S., 50 miles above the "Meeting of the Waters," in August 1872. In summer doubtless there is abundance of water, but then there would be a current to overcome of about 4 knots an hour; moreover, much danger would be incurred from the descent of large trees, which feature the natives have remarked to me is especially noticeable in the flood season, that is from December to April.

He remarks that he is not inclined to think the country unhealthy. From much greater experience than he possesses, I am enabled to say it is extremely so, though perhaps not deadly to the prudent and acclimatised European.

I cannot endorse his statement as to the large timber on the banks of the river, though large trees are found there fit for ordinary purposes in the construction and repair of large boats, though in sufficient quantities to be of commercial value.

Many of the proper names given by this writer are confusing, inasmuch as the prepositions "gwa" or "qwa," "at" or "to," are often prefixed to names; for instance, "Qualikoto," is meant for "Likoto," or "Lukorto." Likewise Quanyambi should be Inyambi; Quasilinda, Silinda; Cunyana is meant for Mankanyana. The Nwetzi River for the Inwenetsi.

He attempts to define the limits of the Amatongas, Butongas, Tongas, &c. These are not trivial appellations; he might as well try to define the limits of the "Kafirs." Tonga simply means something which is not a Zulu.

He remarks the river known as the Umkomogazi is also called Uhluauhle. This latter word is meant for Luauhla, or the sea, and does not pertain to the river at all. He says, further, that this river is 600 yards wide. Mr. Robert Dubois, my companion, who proceeded up it in a boat from Lorenzo Marques, says that it is not nearly so wide, in fact, though deep when once over the shallows at the mouth, seldom exceeding 100 yards across.

Mr. Dubois remarks that the name Manissa, or Maniça, given to it by the Portuguese, is the name of Magudu's district on its banks, and was the name of his great-great-grandfather, probably the first chief of these emigrant people.

Captain Elton mentions Quonquondyan's: he probably means Manyanganye; the river there, the name of which he does not give, is called Samban.

He says the ground-nut, or *Arachis hypocarpogea*, has a heart-shaped leaf; not so; it has a quarter-foil leaf.

Though I have now been in Africa nearly 16 years, I have never heard of the native women elongating their breasts artificially as they are stated to do by this traveller. Since the publication of his Journal, I have made inquiries on this subject, and have not been able to confirm this statement.

I must conclude these remarks by mentioning that "The Meeting of the Waters" was determined in 1868, by two observations of the sun or the meridian, as under:—

August 1st.—Dbl. alt. ⨀ sun's upper limb overlapping, rising 96° 29′ 55″.

In calculating these observations, an error was made by adding instead of deducting the semi-diameter of the sun, in consequence of a misconception as to which limb of the object had been taken; but as it is stated in the 1868 journal, no other than the sun's upper limb can be meant, though the lower limb was erroneously adopted. The result, as stated in my 1868 Journal, was lat. 23° 34′ S.; on recalculation now, taking the upper limb instead of the lower limb, the result will be lat. 24° 8′, which latter result was reconfirmed in 1872, by observation of the sun on the meridian, and of the stars on the meridian north and south.

On reference to the printed Journal of 1868, it is stated that the images "were overlapping whilst the sun was rising," or shortly, "ov^{g}. ris^{g}." Thus it will be seen that this error is fully and satisfactorily accounted for.

All my other 1868 determinations were reconfirmed in 1871 and 1872.

Nevertheless, as Captain Elton took *no astronomical observations*, and adopted my erroneous position for "The Meeting of the Waters," that point must be transferred in his map from lat. 23° 34′ S., to lat. 24° 8′ S.

The longitude of Lydenburg is undecided. In 1868, I took a single observation, and told Mr. Mauch the result, namely, 31° 30′ E. He told me it agreed with his observations. Consequently, it has been adopted both by our Society and Dr. Petermann. I afterwards recalculated my observation, and found the original calculation erroneous. Mr. Mauch evidently misinformed me, and adopted my single and, therefore, valueless observation. Dr. Petermann being informed of this, saw fit to move Lydenburg in his map, 'Originalkarte der neuesten Entdeckungsreisen in Süd-Afrika, &c., 1872,' to 30° 44′ E.

By the map which accompanies this it will be seen that my bearings and distances carried down to Newcastle, in Natal, which is sufficiently determined for the purpose, makes Lydenburg in long. 30° 34′ E., or if the difference of departure and longitude be taken into account, in long. 30° 37′ E.; so that Dr. Petermann's last position is sufficiently near for all practical purposes of the pioneer explorer.

All positions, therefore, depending upon the original position of Lydenburg in long. 31° 30′ E., will have to be amended by its new and more correct position.

I may as well state here that Mauch's positions in longitude depend on dead reckoning only after carried up from places also undetermined, though his latitudes are from observation.

APPENDIX C.

Itinerary of Mr. St. Vincent Erskine, from Lydenburg to Newcastle, Natal, with Bearing and Distances, taken to establish the Longitude of Lydenburg.

Date.	Direction. Magnetic Direction.	Direction. Magnetic Declination.	Direction. Compass Index Error.	Direction. True Direction.	Time.	Rate.	Estimated Miles.	Reduced Distance.	Traverse. N.	Traverse. S.	Traverse. E.	Traverse. W.	Remarks.
1872. Oct. 11	S. 50° W.	W. 24°	Deduct for Magn. Var. 12°	S. 38° W.	hrs. 3½	6	21	19	..	15·0	..	11·7	Leave Lydenburg, pass up Dorp's River. Barometer at Lydenburg, mean of 13 daily observations, 25·2. Altitude 4781 feet. Trappean formation. Latitude by observation of sun and stars N and S, confirming 1868 determination, 25° 5′ s. Bearing of Delagoa Bay magnetic south-east, distant 134 geographical miles. Steenkamps Berg, very high to the west, long continuous range. Dorp's River rises at Spiven Koss 12 miles by road. Altitude of highest point on road between Dorp's River and Umgwenia at 12 miles, 5237 feet; Barometer reading, 24·8. Abrupt descent to Valley of Umgwenia. River Valley. Shale and Trachyte. Cross three small streams and put up at Avetyee's under Koppie Aleine.
,, 12	S. 20° W.	..	..	S. 8° W.	1½	..	9	8	..	7·9	..	1·1	Barometer at Umgwenia 25·9 = 4034 feet. Barometer at 8 miles on plateau, dividing drainage of Umgwenia and B. B. Kraal Spruit 24·4 = 5650 feet. Precipitous mountains on right hand. View of Falls of Umgwenia, off high precipices of Steenkamp's Berg. Low land; Diorite Plateau; red shaly sandstone; red soil.
,,	S. 50° W.	..	..	S. 38° W.	1½	..	9	8	..	6·3	..	4·9	Cross Blue Bok's Kraal Spruit at end of stage. C. Fouvie's Farm.
,,	S. 35° W.	..	..	S. 23° W.	2	..	12	11	..	10·1	..	4·3	At 4 miles and 8 miles cross two streams; and at end of stage, Eland's Spruit, Potgeiter's Farm.
,,	S. 20° W.	..	..	S. 8° W.	2	3½	7	6	..	5·9	..	0·8	At 6 miles pass Eland's Koss, about 270 feet relative to the road. Barometer 24·2 = 5821 feet. End of stage, Stultz's Farm. Barometer 24·6 = 5438 feet.
,,	S. 10° W.	..	..	S. 2° E.	2	5	10	9	..	9·0	0·3	..	Valley of Umkomati. Open, with bold undulating country around. River at drift, about 5300 feet. Formation white sandstone.
13	S. 50° W.	..	..	S. 38° W.	2	6	12	11	..	8·7	..	6·8	Cross Umkomati at starting after crossing a small stream, ascend plateau at 11 miles. Barometer 24·0 = 6111 feet. Freestone. At 4 and 6 miles cross affluents of Kloss Spruit, first waters of Vaal or Likwa River, to Atlantic Ocean by Orange River. At end of stage reach Clarke's Store and Lake Chrissie. Barometer 3 miles back, highest on whole road, 23·8 = 6335 feet.

,,	S. 15° W.	..	..	S. 3° W.	1½	..	9	8	..	8·0	..	0·4	Barometer at lake 24 2 = 5821 feet. Lake impregnated by soda and salt, undrinkable. Bluff of white sandstone on south side, horseshoe shaped.
,,	S. 15° W.	25°	..	S. 2° W.	2	..	12	10	..	10·0	..	0·3	
14	N. 70° E.	..	..	N. 57° E.	3	..	18	17·5	9·8	..	15·1	..	Hamilton, Barometer 24·1 = 6000 feet. Formation, granite-gneiss, eruptive basalt and sandstone, &c. Umpilosi River said to run into Usutu. Doubtful; probably identical with Umbolosi of 1868 journey, and the Dundas or Lorenzo Marques River, of Delagoa Bay. Many lakes; the largest, Lake Chrissie, 36 miles in circumference. Extensive patches of flat bare sandstone. Finest country on the road.
15	S. 30° W.	..	..	S. 17° W.	3	..	18	16	..	15·3	..	4·7	To Botmas, drainage still to Umpilosi.
16	S. 30° W.	..	..	S. 17° W.	1½	..	9	8¼	..	7·9	..	2·4	Barometer at 6 miles 24·0 = 6111 feet. Watershed between rivers to east and west. Cross stream at end of stage, following to Vaal River, and pass Joubert's Farm.
,,	S. 50° W.	..	..	S. 37° W.	1½	..	9	8½	..	6·6	..	4·9	At end of stage another Joubert, and a stream to Vaal River.
,,	S.	..	..	S. 13° E.	1	..	6	5	..	4·9	1·1	..	To a house.
,,	S. 20° E.	26°	..	S. 34° E.	1	..	6	5½	..	4·5	3·1	..	Then pass down Stony Valley and stream to a house; ascend stony hills, and cut off road to Smidts in a deep gorge, with a strong stream with sandstone bed and over a rise to Buhrman's.
,,	S. 60° W.	..	..	S. 16° W.	3	..	18	16	..	11·1	..	11·5	Cross Vaal 2 miles from start. Sandstone bed. Barometer at drift, 24·6 = 5438 feet; ascend stony rise. At 8 miles barometer 24·2 = 5821 feet. Cross stream at 12 miles and to Robinson's Winkle.
,,	S. 60° W.	..	..	S. 46° W.	1½	..	9	8¼	..	5·8	..	6·0	Cross Weld Spruit at starting. End of stage. Village of Amersford on Sphollop Spruit, and passing through Poort.
,,	S. 25° W.	..	..	S. 11° W.	1½	..	9	8½	..	8·3	..	1·6	Cross Sand Spruit to Costrop's stone on Verzamelberg Range. Here Verzamelberg starts out from Drakensberg, and thence takes a westerly direction.
17	S. 20° W.	..	..	S. 6° W.	1	..	6	5½	..	5·5	..	0·5	To Harrison, Junr.; fifteen minutes after leaving Harrison's, cross a stream, the Natal boundary.
,,	S. 20° W.	27°	..	S. 5° W.	2½	5	12	11	..	11·0	..	0·1	Lang, Junr., descending Drakensberg between Harrison and Lang.
,,	S.	..	..	S. 15° E.	1¼	..	6	5¼	..	5·0	1·0	..	Pass Lang, Senr., and to a river on the Buffalo or Umzinyati.
,,	S. 20° W.	..	..	S. 5° W.	1½	6	8	8	..	8·0	..	0·7	Arrive at Newcastle. Barometer 25·8 = 4050 feet.
..	..	..	..	..	..	..	235	213	9·8	174·8	20·6	62·7	
..	..	..	..	..	..	..	..	..	..	9·8	..	20·6	
..	..	..	..	..	..	..	..	..	..	165·0	..	42·7	

Notes.—My original map was constructed by common scale of equal parts 8 to the inch throughout. No allowance made for difference of longitude and departure. Consequently the longitude by the map, as the miles of departure represent more than the miles of longitude, is less than the true longitude; *i.e.*, longitude by the map being 30° 34′ E., by calculation 30° 37′ E.

St. Vincent Erskine.

Course S. 14¼° W. (nearly) 171 miles.
Diff. Lat. 2° 45. Dep. 42′ .. .. { Lat. left. 25° 5′ { Mer. pts. 1556
Middle Lat. 26¼°. By Mercator's sailing .. .. { Lat. in 27° 48′ { Mer. pts. 1738 / Mer. Diff. 182

Course 14¼° Diff. Lat. 182 = True Difference of Longitude .. 45′ over the 52′
Consequently given Longitude, Newcastle .. .. 29° 52′
The Longitude of Lydenburg .. .. 30° 37′

APPENDIX D.

ABSTRACT of all that remained of Mr. ST. VINCENT ERSKINE'S ASTRONOMICAL JOURNAL of 1871 and 1872.

		°	′	″
1872, September 16.—Tabi River. Sisani Mashali's :—				
	Double Meridian Altitude α Aquilæ N.	115	5	10
	Result	23	56	0
" " 21.—Upaluli River. Lions Donga :—				
	Double Meridian Altitude α Aquilæ N.	114	45	30
	" Index error			−30
	Result	24	6	0
" " 22.—Stream west of Sumbani's old kraals, on Upaluli River :—				
	Double Meridian Altitude α Aquilæ N.	114	43	30
	" Index error			30
	" α Pavonis S.	113	52	30
	" Index error			−30
	Mean result	24	6	0
" " 23.—Basutos, near Myaki. Upaluli River :—				
	Double Meridian Altitude α Aquilæ N.	114	46	43
	" α Pavonis S.	113	49	0
	" Index error			−30
	Mean result	24	4	0

IV.—*On the Central Provinces of Madagascar.* By JOSEPH MULLENS, D.D., Foreign Secretary of the London Missionary Society.

[*Read*, January 25th, 1875.]

THE travellers who, in recent days, have visited Madagascar, have (as a rule) landed on the east coast of the island, have proceeded to the capital by one particular route, and by that same route have returned. A few others have also visited the ports on the sea-coast; have given us brief descriptions of the towns and villages named in the coast surveys; and have told us something of the manners of the coast tribes, their rude life, their low superstitions, and their continual feuds. On these points we are indebted to French travellers and naval officers, as well as to Englishmen. What they have told us, however, does not amount to much. They describe chiefly that narrow strip of Madagascar, 25 miles wide, which lies on the east coast, between the mountains and the sea, along the whole

length of the island. The splendid bay of Diego Suarez; the wooded promontory which forms the east shore of Antongil Bay; the colony of Benyowsky and the Isle of Ste. Marie; Foule Point and Tamatave; the lake of Nosibe and the lagoons that follow it; Andevoranto and Mahanoro and Mananzára; the limestone cliffs of Anosy; the vale of Ambolo; and the settlement of Port Dauphin: these are the points that are referred to by successive writers, from Flacourt downwards; and all that needs to be said respecting them will be found carefully compiled in Ellis's 'Madagascar,' written more than thirty years ago. On one point only we have received much light in recent days, viz., on the line of lagoons traversed in his boat voyage by Captain Rooke; and which, like the backwater of Malabar and Cochin, can be easily made available for safe internal navigation by the native canoes.

Of the western part of Madagascar we know little; though, from the great breadth and richness of its provinces, we should like to learn a great deal. Mr. Boothby, in the time of Charles I., and Drury, in the days of Queen Anne, give us information about Augustine's Bay. Captain Owen and the officers of the English Navy, who in 1824 laid down so much of the coast-line, have dwelt upon the great harbours of the north-west and north. To M. Guillain we are greatly indebted for information respecting the same quarter, the island of Nosibe, the Hova settlements near Pasandava Bay, the town and port of Mojanga, and the Sakalava Districts as far as Morondava; and we owe much to Mr. Lyons Macleod, formerly Consul at Mozambique, and still more to Mr. Ellis, for giving us a careful summary of this information. During his personal visits to Madagascar, Mr. Ellis scarcely touched the geography of the island at all; he took no observations, and prepared no maps. To the botany of the island, and to the facts connected with the moral condition of the people, he added greatly. Of the geography of the central provinces almost nothing has been written in detail, and some things which have been written are exceedingly incorrect. It is of these provinces I have now to speak.

The traveller who has seen most of Madagascar, previous to my own visit, is M. Grandidier. This gentleman spent several years in the island between 1865 and 1870, and devoted much time and strength to the examination of several of its districts. He visited the north-east and southern provinces, and resided a considerable period at St. Augustine's Bay and at Ambondro, on the coast of Menabe. He went up to the capital from Mojanga; examined and mapped Imerina; then crossed the island through the Betsileo province; visited the almost un-

known district of the Sihánaka tribe; and finally left the island by the port of Tamatave. His observations have not yet been given to the world: he has read to the Geographical Society of Paris, and has published, an important paper on the general subject of his travels, and has published a general map of the island on a moderate scale, far more correct than anything which had preceded it; but the geographical world yet waits for all details, which he promises to them in ten or twelve volumes. None will give to the results of his visit a more kindly welcome than the English missionaries resident in the island. His purpose, to exhibit and illustrate the country, falls in with their own. His courtesy, his kindness to the people, his excellent conduct and his earnestness in his work, commended him to their regard, and he found among them sympathisers and friends.

The usual maps of Madagascar are traceable to two sources. The coast was laid down by Captain Owen and his companions in 1824. The detail of the interior given in all recent maps is derived from the map of Colonel Lloyd, two originals of which are in the hands of the Geographical Society and of Mr. Stanford. The map was published in 1851 by Mr. Arrowsmith; and Colonel Lloyd's Memoir on Madagascar will be found in vol. xx. of the Society's 'Journal.'

To myself this subject of Madagascar geography has been one of interest for several years; and the more carefully I studied it, the more clear it became to me that of the interior of the island almost nothing definite was known. Being anxious at one time to provide for the use of our Missionary Society a good map of Imerina, and next of the Betsileo province, we applied to Mr. Stanford, but found that details were entirely wanting. We knew the names of prominent mountains, rivers, and towns, with some particulars of their character, but where to place them with exactness none could say. The Directors of the Society then turned to our missionaries in the island; and request was made that in their journeys, especially to new places, they would make special note of heights, distances, times, and places; would mark these particulars in sketch-maps and send the information home. Several excellent journals and sketches were in this way communicated to us. The principal contribution to our effort was this: Mr. Cameron, the senior member of the mission, who first joined it in 1826, after carefully fixing the position of Antanánarivo, commenced a triangulation of the plain of Imerina. He measured a base-line of 3 miles along the level bunds of the Ikiopa; and from it began to observe with due care and exactness the position of the most prominent hills. Step by step Mr. Cameron pre-

pared a valuable map of those portions of the province contiguous to the capital. But it had this defect that, though it indicated the positions, it did not exhibit also the height and form of the ground. M. Grandidier tells us that he too triangulated the Imerina plain, that he made a large number of observations, and that he took as base a line of 36 miles, its extremities being the peaks of two mountains on the same meridian. Many of the results of his own survey Mr. Cameron communicated to M. Grandidier before the latter left the island.

Being deeply interested in this matter, it was with peculiar pleasure that I accepted the invitation made to me, two years ago, to visit Madagascar on public duty. Aware that part of that duty would oblige my colleague and myself to visit thoroughly the central provinces of the island, we prepared to take advantage of our opportunities and add something at least to the knowledge of those provinces possessed by the geographical world. Had we known how great those opportunities would be, we should have endeavoured to obtain better instruments, and prepare ourselves more thoroughly to use them.

We find that our work coincides to some extent with what M. Grandidier has done, but differs from it in this way. He has seen far more of the sea-coasts and of the Sakalava tribes than we have done. We, on the other hand, have traversed the centre of the island far more fully than he, and have visited many localities of the first importance, of which he has seen and said nothing. On one vital point our circumstances differed greatly from his. Judging from his paper, he seems to have been greatly afraid of the natives. Not only among the Sakalavas, but in Imerina, he always fancied himself in danger. On one journey he certainly was watched, and was obliged to hide his instruments and observations; and he always carried fire-arms. My colleague and I had no need to indulge such fears. We were everywhere received as friends. We were known to be specially deputed from England by the Society which has instructed the Hova and Betsileo tribes for fifty years, and which is regarded by them with the most grateful affection. We were therefore allowed perfect liberty to go where we liked; we invariably informed the Prime Minister of our plans, and we experienced nothing but hospitality and kindness. By special permission, we photographed the Queen's Church and Palace, and even the Royal tombs; we planted our theodolite, compass, and tripods on the tops of hills or in the open markets; and we let everyone know that we were anxious to make a correct map of the country for their use as well as ours.

We endeavoured to act on system. In the first instance, we worked on Mr. Cameron's lines. We went over a great portion of his work; revised it from our own observations, and extended it in all directions. North-west, we laid down Vonizongo as far as the population extends. West and south-west we carried the survey to Ambohiveloma and the granite ridges beyond; then over all Imamo, round the south and west of Lake Itasy, and the districts of Mandridrano and Menabe. Thence we passed it through Betafo and Sirabe; connected it with the previous survey to the south of Imerina; enclosed the Ankarat Mountains within it, and measured their height. With Mr. Cameron himself we continued the survey down the Betsileo province many miles beyond the point were it was crossed by M. Grandidier, and at the town of Fianarantsoa we connected his observations (as exhibited in his map) very satisfactorily with our own. Eastward we carried the survey to the Angavo Mountains, over the moors of Ambatomena and Ambatomainty, and thence to the plain of Ankay and the Sihánaka Lakes. And finally, by a route lying west of that followed by M. Grandidier, we went down to the sea at Mojanga. The red lines on our map will show how fully we traversed the country, and how much of it we saw with our own eyes.

The instruments which we employed were simple but good. We had a surveyor's theodolite, an excellent telescope-compass, a Gravatt's level, an excellent prismatic compass with tripod, a Houghton's altitude and azimuth instrument, and good aneroid barometers. With these instruments, starting from Antananárivo as a fixed point, we followed up the country step by step, greatly aided by the numerous conspicuous hills, with whose names and appearance we soon grew perfectly familiar. Several of them, visible over a vast extent of country, were treated as standard points, to which a multitude of others were referred. Our experience showed how far more important it is that a traveller shall be perfect master of the instruments he has, than be anxious merely to get instruments of a high order. Our instruments were good; but the ease and correctness needed to observe the country with accuracy lay far more with ourselves than with the best instruments we could procure. And, as we gained experience, the simplest were made to yield results which would compare favourably with those derived from the best.

The Navy Surveys show that the island of Madagascar has a length of 818 geographical miles, measuring from Cape Amber on the north, to Cape St. Mary's on the south: the position of the former being in lat. 12° 2′ s.; that of the latter in lat. 25° 40′ s. The greatest breadth of the island from Cape

St. Andrew to Tamatave is 300 miles; the longitudes of the two points being long. 44° 30′ E., and long. 49° 28′ 30″ E. The longitudes have all been fixed by reference to the Observatory at Cape Town, and presume that that longitude is 18° 28′ 45″ east of Greenwich. The island is a long oval, pointed at the north end, and its major axis runs in the direction of N. 16° E. The ground is highest along the line of its centre, and only its two sides are level plains near to the sea-coasts. To me it seems to lie upon the water, like one of the huge alligators which we saw floating on its greatest river, with head and tail submerged. A crevasse and channel of great depth separate it from the continent of Africa, while the Farquhar Islands, the Seychelles on the north, with their red clay, and the coral patches of Rodriguez and Calvados seem to me to connect the line of its granite hills with the Laccadive and Maldive islands, and with the mighty forces which in Southern India threw into their present position the Nilgiri and Kunda hills. The island seems to me the noblest portion of some broad continent, which stretched away from the coast of Hindustan to the south-west, and occupied a vast portion of the Indian Ocean. It shared in the tropical flora and fauna of India in a very early stage of the earth's history, and was separated from it while both were still young.

The chief physical feature of Madagascar is the central mountain mass, which commences with lofty hills at its northern extremity, and retains them till within a moderate distance of its southern cape. This mighty mass is by no means uniform in its appearance. Ascending from the eastern coast to the capital, the traveller meets and successively passes three lofty mountain-walls, each supporting a broad terrace behind it. The first and lowest meets him at two days' distance from the coast: the second lies behind, two days further off, near the forest-station of Beforona: over the third (the object of his deserved admiration, as it stretches away far, far to the north, still on and on to the south), he climbs by the lofty pass of Angavo, and then finds himself on the broad plateau of Imerina, the dwelling-place of the ruling tribes. On the western side also the terraces exist, and are descended one by one, though they are not so grandly marked as on the east coast, and are more easy to travel. On our own journey from Imerina to the north-west, along the line of country followed by the two principal rivers, we experienced four special descents, each being about 800 feet, and each having a distinct pass. The line across these passes is the line of the ancient tribal raids, and along which the present military posts are established.

On the east side of the island the three walls converge on a common point toward the northern districts. In visiting the Sihánaka province we saw the two higher lines meeting beyond the Alaotra Lake, in lat. 16° 40′; and the wild sea of hills resulting shows the grandeur of the forces employed in shaping their present form. Away to the south the terraces keep distinct, until (as we saw for ourselves) they are crossed, in lat. 22°, by a strong range which runs from west to east, when they come to an end, and fall into that level plain swept by the south-east winds, on which M. Grandidier found new shells and bones of Sindbad's celebrated birds. The terraces seem to be between 30 and 40 miles wide. They are far from level. Strong winds, heavy storms of rain, waterspouts, torrents, have cut deep channels in the sandy red clay, which has been deposited among the gneiss rocks, which form the basis of the island; and as these hills and cuttings follow largely the northerly set of the granite ranges, while the water seeks an outlet in the sea, we found ourselves in a maze of red hills, and went forward up and down, down and up, many times in a day, multiplying indefinitely the miles we travelled, and along which our wearied men lifted us and carried us to the city which was to be our home. On the west side of Imerina the red hills are even more conspicuous. We saw them at many points: it was impossible to map them, the cuttings are so numerous; but we had to travel among them again and again, and found nothing in our journeys so painful to traverse. Such a hilly country, so continuously hilly as Central Madagascar I have never seen in all my wanderings in the United States or in the Eastern world.

The principal portion of the central plateau is occupied by the plain of Imerina, and its southern continuation, the Betsileo province. At its north end this plain is bounded by the mountain mass of Andringitra, and the hills of Manga and Molangána. On the east it begins above the Angavo forest, and goes westward to Ambohiveloma and Itasy, where it falls into the western plains. In this part the province has a breadth of 90 miles, and a nominal length of 110 miles. Eastern Imerina is pierced by granite hills, and ranges more or less high, which bear upon their shoulders barren moors, swept by the hard east winds. The South has been greatly affected by the volcanic disturbances which I shall shortly describe. It has few fertile spots, and its population is scattered and thin. The thoroughly-cultivated parts of Imerina are spread over a space of 50 miles by 25: about 1250 square miles in all. Even here the level is not perfect. Low ridges of red clay run across the plain, generally from the west and north-west, toward

the south-east: and it is on these, and on isolated portions of them, that are built the numerous villages and towns. It is in central Imerina that the population of the island is thickly set. There is abundance of food. The red hills offered, by their height, places of security around which deep fosses might be cut, or over which great cactus-hedges might be planted, for the terror of one's bare-footed enemies, and for still greater inconvenience to one's friends. The great plain is watered by numerous streams from the eastern hills, or from the volcanic district to the south; and, however they score the valleys, or wind among the hills, or spread themselves out upon the level rice-grounds; whether the Mamba, the Varáhina, the Sisàony, the Kàtsaoka, or the Anjomoka; they all meet at last in the Ikiopa, and all find their way into the sea down its rocky ravines. We visited many of the upper waters of these rivers; we followed the rice-valleys, or came upon the scattered villages with their red-brick churches conspicuous for many miles. But there was one spot on which we looked with peculiar interest, the *Farahantsana*, or falls of the Ikiopa. It is a noble reef of rócks, which bounds one portion of the Imerina Plain, and west of which the ground begins rapidly to fall. The river approaches the rocks sluggishly; through all the eastern plain it flows slowly, depositing its rich silt. Once over the reef, the waters boil and foam, and hurry away, against rocks and boulders, fast and furiously to the sea. That reef is the saving barrier of the country. Had it not existed, or had there been nothing in its place, during the long ages which have passed since the plain rose out of the sea, the fine soil now teeming with fertility would have been carried by the falling waters down into the plains, and the whole of Imerina would have resembled the scored and ruined districts in the province of Menabe. A similar reef at Sinjoarivo retains the waters of the Onibe; and yet another, the winding stream of the Manánantanána, in the great rice-plain of Ambohimandroso. Nothing bût these rocky barriers has secured a quiet resting-place for the rich silt and the fertilising water at the height of 4500 feet above the sea.

Bordered by grand hills of varied forms and studded with hundreds of villages and towns, Imerina is in many respects one of the most beautiful and picturesque provinces of Madagascar. Here it is gay with the brilliant green of the young rice; there it is shaded with dark patches of wood around Námehana and Ilafy. Here it shows the great turtle-head rock of Ambátomaláza, or the lofty towers of the Three Sisters; there the long slope of Fandravásana, the lofty peaks of Antongona, or the towering masses of Ankáratra. Here lie the broad waters of

the Queen's Lake, with its little island embowered in trees; there stand conspicuous clusters of villages, with their neat huts, the green ramparts of Ambohidrapeto, or the towering Amontana tree of Ambohidatrimo. It is impossible to survey the wide-spread scene from the lofty hill of Antanánarivo without feelings of exhilaration and delight. We know the golden glory which at sunset lights up the snows of Switzerland: but nothing can exceed the sharpness of the light as it plays over the landscape in the crisp, clear air of Madagascar after refreshing rain; and no pen can describe the deep golden blush which beautifies the red hills with an unearthly radiance when the autumnal sun sinks calmly to rest. Day after day, from the terrace of my Madagascar home, I looked with feelings akin to rapture on that wondrous scene; for I saw on every side not merely material beauty—the grace of form, rich tones of colour, or even the bountiful supply for a people's wants,—I saw the proof of a young nation's progress: new houses rising in the villages; new homes of better pattern for the richer classes. I saw the fortressed hills deserted for the open plains; peace, security, and mutual confidence, where once prevailed intestine war; I saw the new school-house and the handsome church instead of the rush-buildings of five years ago. I saw that men were living in truer fellowship with men; because all together were striving to rise higher toward God.

Over all the higher portions of Madagascar, and far into the lower plains, the chief constituent element is gneiss or granite. Whole ranges of it appear on every side, and the enormous gneiss boulders scattered over the hill-sides form a conspicuous feature of the landscape. In certain districts the primitive rock is a fine felspar granite, of a delicate rose tint; these granite ranges were the noblest rocks we saw. In one valley this granite took the form of graphite, and, as usual, the square crystals of felspar presented a singular resemblance to Hebrew writing. Connected doubtless with this extensive felspar element is the profusion of red clay which strikes the traveller wherever he goes. It forms enormous hills; it has buried and covered in innumerable boulders; in various valleys and cuttings it is hundreds of feet deep. At times it is stiff and strong, at others it is full of fine sand; and when once water gets into it, whole hills are washed away into the lower valleys. Nowhere is this feature so conspicuous as in Ankay. Again it is hard and gritty with coarse sand. It naturally follows, that, on the whole, the soil of Madagascar should not be fertile, and that where the hard winds have hindered vegetation, and the rains have for ages washed away the salts of the soil, it is hard and

poor. Only in the bottom have the finer constituents remained, and these, enriched by decayed vegetation, are universally appropriated to rice. All over Imerina, in many localities, are seen banks and hills of mica mud.

There is one notable exception to these formations. The central province of Madagascar has been the scene of volcanic eruptions on an enormous scale. Twenty miles to the south-west of the capital is a fine group of mountains, the lofty peaks of which stand conspicuous in fine weather against the clear blue sky. These are the Ankárat Mountains. From a distance the mass is seen to be broad, to rest on an enormous base, and, when measured, it turns out to cover a space of 600 square miles. From the Imerina plain, 4500 feet high, the traveller rises steadily to 6000 and 7000 feet before he reaches the foot of the great central peaks. These occupy a space of 54 square miles. They are five in number, with minor elevations around them. M. Grandidier refers especially to one of them (Ambohitrakoholahy), and calls it the highest; but, owing to the mists, he failed to ascend and ascertain this for himself. We ascended two, measured a third by the theodolite, and eventually our native assistant measured all five. Their heights range from 8000 to 8950 feet, and they are the highest mountains in the island. They are all of volcanic origin, and though we saw no distinct craters, we observed that they were covered with broken lava, and we traced the streams of lava flowing from the centre on every side. Near their feet on the east are other centres of volcanic outflow and great lava hills. On the south these streams run out for 25 miles. On the west and north also the long tongues of lava can be traced far into the plain; and it was exceedingly interesting to note both the lines on which the lava and the clay lay distinct, side by side, and the sections of the lava strata, through which some stream or road had cut its way.

But this was not all. On reaching the neighbourhood of Lake Itasy, 40 miles west of Antanánarivo and 25 miles beyond the central mass of Ankárat, we at once found new traces of volcanic agency; and when we ascended the lofty hill overhanging the western end of the lake, crater after crater met our astonished gaze. Some were of enormous size, some were small; some were lofty, others were low; some were cones, others were hollow—were horseshoe in shape, and had long ridges of lava running out from the open side. In several cases the ridge was double. Their forms were beautiful, and the sides of most were richly clothed with grass. We spent several days among them, ascended the highest and most central, Ambóhimailála, and carefully mapped the district. There were forty craters in all, of which

we were sure; we think there were others beyond to the north. In the midst of the group were little lakes and pools of water, and one charming piece of water, Lake Kazamba, which we have reason to think no Englishmen except ourselves have seen. Lake Itasy, which is on the eastern side of these volcanoes, we have mapped for the first time. This lake, we saw, has been formed by the elevation of the land and the outflow of the lava streams. At the western end it looked shallow; the fishing showed it to be shallow, and the ground around it was very swampy. Toward the east, where its chief feeder runs in, the water is deep. It is not a ravine, with some natural barrier at its lower end; it is a submerged level. Many streams flow into it from the country round, and it has only one outlet, on the north, through the northern portion of the volcanic district. The lake is 8 miles long and 2½ miles broad: it contains six little peninsulas jutting into the water, one of which is called Ambonihazo, "wooded hill," a pretty spot, with a little village and its pretty church embowered among the trees. Fifty miles further south we came on the volcanoes again. We had observed three groups of them out on the western plain; but when we reached Betafo and examined the district carefully, we were more astonished than before. We climbed a lofty rounded hill, called Ivoko, which we had seen 20 miles away, and duly noted, and then found that we were on the crater wall. The inner hollow was a quarter of a mile wide, the height of the wall above the level country outside was 600 feet; two lava streams went out toward the south and west, three small craters were at the foot, and others, large and conspicuous, were around us on every side. Close by, another huge crater, Iatsifitra, had its opening toward the north, and the lava that had issued from it was fresh, black and sharp, as if broken yesterday. But, stranger still, at its eastern side was a plain, a mile square, covered with heaps of lava, like stone cottages, fortresses, ruined palaces. I counted thirty greater piles and noted numberless smaller ones: it was clear that, like the Phlegræan fields in Italy and the neighbourhood of Mouna Roa in Hawaii, at one time the entire plain had been on fire, that a hundred jets of fire and flame and molten lava had spurted from its surface. The heaps were now old and moss-grown; but one of the peasantry informed Mr. Sewell that there was a kind of tradition amongst the people that their ancestors had seen these flames bursting forth. The newest lava was on the western side and near the crater. Travelling further east, round the southern foot of Ankárat, we had the lava still—long tongues, cinder-heaps, and old craters again and again; and having ascended one of the noblest hills of the country, the conical peak of Votovorona (a most important station in our

survey), we found it volcanic also. Another fine cone to the eastward, named Ihankiana, was volcanic too. Altogether, in that important journey, we saw and counted 100 extinct craters, extending over an arc of 90 miles, not reckoning the central mass of Ankárat, round one side of which that arc bends. The volcanic belt is continued to the northward in the great hills with which the island terminates. The hill of Mataola, Mount Amber itself, the island of Nosibe, the island of Mayotta, the island of Johanna—these (as our eyes have seen) are all volcanic. The range over which the volcanic area is spread is enormous. What a mighty volcanic force must have been exerted over this vast space! Does Java itself show a nobler volcanic field? If human eyes could have beheld and appreciated them, what a scene of indescribable grandeur must have been presented when these volcanoes were active; when the land was rocked with earthquakes and the great hills of gneiss and granite were rent in pieces; when vast showers of blazing rocks shot out, like meteors, into the lurid night; and when the molten lava-streams poured, like rivers, out of the mouths of these flaming furnaces! Wonderful in the history of the earth has been the agency of fire: nowhere could that agency have been exhibited more grandly in the present age of the earth's history than on the great volcanic field of Madagascar.

Among the adjuncts of the volcanic field we found four hot springs, three of which are near together in Betafo and Sirabé. The temperature of the spring at Betafo, as tried by Mr. Cameron, was 130° Fahr., and the water seemed perfectly tasteless. In three places we also found jets of carbonic-acid gas. Beneath the broad plain of Sirabé, extending over 50 square miles, there is evidently a great deposit of lime: the pits of Sirabé supply most of the lime used for building in Imerina and the capital. With the exception of some lime-deposits north of Ankárat, and a little sandstone in the Betsileo, they are the only secondary rock we found in all the higher parts of Madagascar: no fossils have been found in it. It is from this lime that the wells of carbonic-acid gas are derived. One well, with numerous jets, was connected with a filthy mud-pool: the water boiled all over the surface, and the natives could not imagine why it remained quite cold. In a second case the tubular well was dry, and we found butterflies and various insects lying dead around the mouth: we were told that frogs and mice also are at times found dead there. Among the lime-pits the bubbling springs are numerous. A huge stalactite lime-rock has gradually risen at one point, with dripping caves in its sides, and on the top of the rock a hollow basin has formed itself; water from the rock flows up into this basin, bubbling as it rises, which is neither more nor

less than natural soda-water, of which we could drink as much as we liked without charge. I am sorry to say that the natural product was as flat as the artificial.

During our journey we looked everywhere for columnar basalt, but failed to find it. We saw abundance of surface-lava broken in pieces. In a cutting at Betafo we examined a variety of strata, the result of repeated eruptions—strata of black volcanic earth, of brown earth, strata of ashes many inches thick; but of columnar rock there seemed to be none. At last we found a single patch of it: it covered a space of 30 feet by 20. The columns were, as usual, six-sided, and the pillars exposed on the edge of a little ridge were 4 feet long.

A last point to notice in connection with the volcanic district is, that close to that field—indeed enclosed by it—we found the noblest mass of granite rocks which we saw north or south in Madagascar. This great mass is termed Vavavato. It consists of several lofty ridges parallel to some degree with one another, yet starting from one northern point and curving, pear-like, round to the south. Some of the ridges are quite closed at the south end and form a *cul de sac*, whence the name is derived. The ridges are lofty, their summits serrated, and the separate rocks and masses are truly grand. Between the second and third ridges the fallen boulders are enormous and countless. On the third ridge are the highest peaks, with distinct names. At the north end one group of rocks has a wonderful resemblance to an elephant: it was conspicuous over a vast extent of country, and appears repeatedly in our station-lists. A smaller elephant is close by. The granite of these rocks is well formed, and the felspar, in the best specimens, is of a pale rose tint: the grain is blackened by the sun; it is very rotten, and falls of rock must be numerous—hence the multitude of boulders on every side. A portion of the same ridge we saw far to the north. Another noble mass is Ibety, south of Sirabé; and another ridge of great length, Kipaséha, was the last of the western mountains which we saw at the extreme south of the Betsileo province. Was not the granite shown only in this long western ridge, and partly enclosed by the volcanic fires, the original base of the island? and is it not from its felspar that have been formed the enormous deposits of clay which form so conspicuous a feature in the landscape of its many provinces?

In Imerina the higher plateau has a breadth of 80 miles. As we travelled south, we found it growing narrower. At Sirabé, its breadth is 60 miles. All down the Betsileo province it narrows still; and at Imahazony, on the line of 22° s. lat., as we stood on the top of Kirianga, we were in sight of both bordering lines of hill on east and west, 35 miles from each

other; and the ridges immediately to the south of us crossed the country like a lofty wall, covered with forest, and fairly united the two. The Betsileo province, so far as we saw it, is clear of volcanic influence. It contains long gneiss and clay ridges, which cross it from N.N.W. to S.S.E. Near Fianárantsoa these ridges lie close to one another with but narrow valleys between; and in certain localities the massing of the mountains is very grand. On travelling from that town southward, when we pitched our tents in the broad valley, near the little village of Ambalavao, we had some noble masses overhanging us to the west, while the grass on the lofty eastern hills was all on fire, and long curving lines of flame served both to show the form of the hill and to light up the darkness of the night. On the east is an enormous hill of gneiss; a few miles further to the south-east, where the forest ridge begins, is another mass nobler still, called Ambondrombe, which is believed to be the entrance to the spirit-world. On the west again the hills seemed to increase in vastness and in number. Within the plateau were the noble rounded hills of Iandraimbáki, the high peak of Iody, the curving ridge of Kirianga; while outside them all, on the edge of the plateau, was the lofty, serrated granite ridge of Kipasèha, stretching away to the southward for 30 or 40 miles. The vast bay formed by these wonderful mountain masses contains the broad green plain of Ambohimandroso, rich in rice, and supporting a large population. What lies beyond these hills we longed to learn; but our time was gone: we had accomplished our work in the south, and we were compelled to return to the capital. But we had traversed the whole of the well-peopled plateau which forms the crest of the island as far south as lat. 22°; and, with the help of Mr. Cameron, we had made so complete and connected a series of observations, that without difficulty we could connect the new province with the positions which Mr. Cameron had already laid down in the old. In our survey we had now secured two fixed points of great value.

Mr. Cameron, after careful observations, had placed the capital of Madagascar in lat. 18° 55′ 50″ S., and in long. 47° 48′ 40″ E. M. Grandidier (judging from his map) places Antanánarivo in lat. 18° 55′ S., and long. 47° 32′ E. The latitudes of the two observers are the same; but there is a difference in the longitude of 16′ 40″, or 18·05 English miles. Mr. Cameron places the capital 89 English miles from the eastern sea, M. Grandidier at a distance of 107 miles. My own view of the matter, from the time occupied in the journey, is that the former distance is too little, the latter too great. I am content to take the mean of the two sets of observations, and place the

capital in east longitude 47° 40′, or at a distance of 98 miles from the sea. Mr. Cameron assents to this suggestion, until by further observations with his new chronometer he is able to determine it more exactly.

Mr. Cameron again places Fianárantsoa, the capital of the Betsileo Province, in lat. 21° 27′ 10″ S., and long. 47° 18′ E., *i. e.* 66½ miles from the sea. M. Grandidier's are lat. 21° 27′ S., and long. 47° 3′ E., and 83 English miles from the sea. The latitudes of the two observers coincide; the longitudes again differ by 15′, equal in that latitude to 16·41 English miles. Both place the town of Fianárantsoa, a distance of 29′ or 30′ in long. west of Antanánarivo. In relation to each other, the two observers almost perfectly coincide. Mr. Cameron communicated his observations about Antanánarivo to M. Grandidier; but in regard to Fianárantsoa they are wholly independent; and the fact that they so agree furnishes a strong presumption that, in relation to each other, and to their component parts, these two important provinces of Madagascar are correctly laid down. Having worked out the set of angles myself, I find my own scheme accord with theirs: but, as before, I prefer the mean of the two longitudes, and would place Fianárantsoa in long. 47° 11′ 30″ E., at a distance of 75 miles from the Indian Ocean.

The Betsileo Province has many features of grandeur and beauty about it; but its fertile and well-cultivated spots are few. It contains five districts: Ambositra and Ambohinamboarina, the Isandra, Ilalangina, and Iarindrano. In the political survey of the country, it is usually described as within the Matsiatra or beyond the Matsiatra. The Matsiatra is its principal river, and it is well fed by numerous streams, which rise from the granite and gneiss hills. The water is abundant, and is very pure. The most southern district is termed "Iarindrano," "full of water," and well deserves its name. It has one special river, the Manananantanana, which rises in the hill of Ambondrombe, and makes its way sluggishly across the clay plains to the west, until it finds an outlet north of Iandraimbaki, whence it falls into the Mozambique Channel. Smaller rivers, like the "Ranofotsy," join one or other of these. The chief feature of the cultivation in the province is rice; and the ingenuity with which the peasantry appropriate the water to its sustenance deserves high praise. The well-watered bottoms are few and not widespread. But the people terrace the hills; they trace back the streams and rivulets step by step, till they reach the fountain; and thus the terraces may be seen beautifully levelled high up the hill-sides, and carried into every hollow, whence the water comes; each streamlet does duty many times over. Very

pleasant to the eye are these bright terraces when the rice is young. Very rich in rice is the basin of Ambohimandroso, and the valleys near; green are the fields of Ikala and the bottoms around Ambohinamboarina; but nothing can exceed the skill and care expended on the deep amphitheatre of Nandihizana, in which the terraces descend step by step; and a lavish supply of water from three streams, and the forest near, covers them with a golden harvest, which feeds thousands of human beings. Wherever there is water, the peasantry plant rice. But they place their houses, not in large clusters, in villages of 100 to 500 people: they prefer little holdings, called *válás,* of two, three, or four huts, each set surrounded by a clay wall and a cactus-hedge; and in the absence of wood, which will not grow in the hard, foggy climate, the eye rests with pleasure on these green rings which dot the hill-sides, or the higher ridges overhanging the broader levels, where the rice-plant grows. The productions of the country, as shown in the markets of Fianárantsoa and Nandihizana, are not numerous. Rice, manioc, Indian corn, beef, pork, fowls, a little honey, lambas made of rafia palm fibres; a little coarse silk, coarse but strong spades, timber rafters, spade handles, thick, clumsy window-shutters, with the hinge projecting above and below, grass baskets and earthen plates, these are the chief articles exposed for sale.

We were disappointed as to the population. We had always read of the Betsileo that they were a million and a half in number. As we traversed the country, and saw how empty it is, we asked again and again, where are the people? In a few broad basins, a few open and well-watered valleys, are built a few towns of 150 to 300 houses. All the rest are villages and "valas." Only Fianárantsoa has 5000 people, including the Hova garrison. The Government reckon, in all the Betsileo and Tanala provinces and their various districts, 50,000 *hetra,* or farmsteads, great and small. This would indicate as many families, even allowing for changes since the arrangement was made; and that calculation would make the population 250,000, or not more than 300,000 in all.

The population of Imerina has not, I think, been overrated; but it has not been reckoned very high, and has been usually regarded as 1,000,000 in all. The province, as I have mentioned, may be reckoned at 110 miles long, and 90 miles broad; or about 10,000 square miles. The entire border is thinly peopled: large tracts of hilly country, of high barren moor, or of bare red clay, have very few villages; those which exist being found in scattered valleys, sheltered from the cold winds, or possessing rich land in the bottoms. The well-peopled portion

is 50 miles long and 25 miles broad, or 1250 square miles in all. And here the villages are crowded together; all the best lands are carefully cultivated, and the prosperity of the province is patent to every eye.

Numerous as the villages appear, the population still is limited. The best towns are not large. Antanánarivo leads off with 80,000 people. Ambohimanga has about 5000; one or two other towns have the same; and a few others have from 3000 to 2000. Half of the ancient capitals, the "twelve sacred cities," on "the twelve hills," are in a state of decay, and their population is small. To set the Imerina population at 1,000,000, or 1,200,000, falls in with the general Government calculation and the demands made for feudal service. We must add 100,000 for the Imamo and Mandridrano districts in the south-west, and another 100,000 for the Vakin-Ankárat and the thickly peopled valleys of Betafo and Sirabe, which have 10,000 *hetra*. Thus for the entire of the two principal provinces of the island, Imerina and the Betsileo, with all their districts, enclosed within Noman's-land on every side, we have a population of 1,700,000. Several circumstances confirm this calculation, into which I may not enter.

Our fourth journey from the capital was directed to the Siházaka province, a hundred miles to the north. Five years before it had been visited by one of our missionaries, and M. Grandidier had also been there. But we could get no information whatever concerning it. Where were the stopping places? where was the population? and what was the character of the country? To these points we could find no answer. Our predecessor had left no road bill; and M. Grandidier has published no particulars, except in the section of the general map which relates to the district. The result was a strange experience. I should like to give to the Society a fuller Paper on the details of this and other journeys. I can now speak only in general.

We had left Ambohimanga, had given our men their mid-day meal, and were still in sight of the capital, when we suddenly found ourselves in a district without inhabitants. Towards sunset we reach A'tomainty, a village of 12 houses, in which our 60 men found some kind of accommodation; we ourselves slept in our tent, 11 feet square. For many hours the next day it was the same: we saw three villages of two houses each; and then reached a fertile basin, with several prosperous villages and Christian churches. The principal of these was Anjozorobe. Sunday past, and our men rested, we went on our way. In a few hours we climbed a fine ridge covered with wood, and found ourselves on the edge of the Imerina terrace.

The pass crossed over the highest part of the ridge, and for 40 yards went along a narrow ledge two yards wide, which had deep ravines on either side. It then descended on the east by huge natural stairs, and passed up and down clay hills, through dense forests, and down a richly-wooded ravine. The pass is expressively termed Ambárabáramváto, "the stone gateway." It was late in the afternoon before we found a resting-place where our men could breakfast. The name of the village, with its 12 houses, was *Mandanavatsy*, i. e., "Get your tiffin" before going farther; intended as advice to Sihánaka travellers going the other way—and good advice it is. For three days we journeyed through an empty land, the upper portion of the district of Ankay, sleeping in our tent; at the end of the third day we reached the town of Ambatondrazaka, the capital of the Sihánaka province, and on its south-eastern edge. From the governor and his officers, from the Christian people around him, and then from the congregations in all the principal towns and villages, we received a warm welcome. Only once had they seen an English missionary among them, and that was (as I said) five years before. Turkeys, geese, fowls, eggs, rice and milk, were placed in abundance at our command. Every day we had one ox given to us, and on one day we received two. Our men failed wholly under this prosperity, and were demoralised by the plenty they enjoyed. We found that in its general structure the Sihánaka province is a vast basin in the midst of hills, and having a clear lake and enormous swamps in the centre. The hills cross the country in parallel ridges at an angle of N. 16° W. The water is still high in the basin, and on three sides touches the foot of the hills; in consequence, whenever we passed from one ridge to another we had first to wade through the swamp lying at the foot. For miles upon miles in the open centre, as well as up its many arms, the swamp is beautifully green. Two water-plants grow profusely there, the *Zozoro*, a solid triangular papyrus-reed, 16 feet high; and the *Herena*, a flat sword-blade, which reaches 6 or 8 feet. Often the men made a passage for themselves over the deep water by beating down and walking over the stalks of these noble reeds. Here and there the process of recovery and reclamation has begun, and round the edge of the district rice-fields have been cleared and planted, and villages have been multiplied. In the centre of all, though lying nearer to the eastern shore than the western, is the fine lake of Alaotra. In the northern portion it is perfectly clear of reeds, and its waters run close up to the enclosing hills; in shape it is hammer-headed, and its single outlet is at the north-east corner, where the River Maningory rushes down a rocky

valley to the sea. The lake is 37 miles in length, and is 4 or 5 miles broad. We enjoyed a fine view of the lake from the hill on its eastern side and the village of Ambohitsoa. As we looked on its clear blue waters stretching away to the south, stretching into the north, and running in among the hills; as we saw it in the distance bordered with the green field of reeds, spreading out many miles to the west, and on every side backed by massive hills of varied and graceful forms; here showing the bare rock, there the red clay, there covered with dark wood, while over all was the clear pale azure of an unclouded sky; we thought we had seen few fairer sights in all Madagascar than the landscape at our feet.

The population of the entire district we estimated at 40,000 people. Two towns are of moderate size; the rest are but villages. The more we thought it over, the clearer it became to us that the people were Betsimisáraka colonists from the eastern coast. They had found their way up the rugged valley, the outlet of the waters; they had seen the fair land above the pass; they had found it empty, and then they invited their friends to come and take possession. It is all around this north-eastern portion that the population is most numerous. We saw the hill where their first chief had settled, Ambohitrandrian, or "King's Town." We noticed that their houses were Betsimisáraka; the hair and ornaments of the women were the same; and that, while on the north they have links of connection with the coast, especially with Fenoarivo, they are quite cut off from the Imerina population on the south. After their last village of Mandanavatsy—and the great wall of rock—the first population met with above the hills is Hova, a colony from Ambatomina; below the hills it is Ankay, and is connected with Bezanozano, with Moramanga, and the Tanala. Why, then, did the Betsimisáraka colonists change their name? They did so for a very simple reason, derived from their new position. The word *hánăka* is an old Malagasy word for "lake:" *si-hánaka* denotes many lakes and pools. They gave this name to their new home, and a perfectly true designation it is; and for themselves they became Antsihánăka, which means "the Lakers," "the Betsimisáraka of the Lakes."

The lake country has an area of 2000 square miles; the district being about 60 miles in length by 35 in breadth. It is pear-shaped, the thick end lying to the north. The map we have made of it is original, and is the result of two separate sets of cross-bearings; most carefully connected with our previous survey by an observation of no less than nine principal stations among the Imerina hills. One set was taken by the Rev. J. Sibree, who is a practised surveyor. Our earliest obser-

vations were peculiarly happy, as also were the last. In working out the two sets separately, it was plain that the positions laid down by M. Grandidier in his general map did not coincide with ours: he places the whole district too far toward the west.

Another fact of interest is this. All up the northern portion of Ankay three of the great parallel lines of hills along the island are seen to approach one another. The western line keeps quite distinct to the northern border of the Sihánaka; the two eastern chains (the one the eastern wall of Ankay, and the other apparently the terrace-wall of Beforona) approach one another; and the result is a perfect sea of hills, and clefts, and valleys, which only photography can faithfully portray. The material is a vast sedimentary deposit of red clay, with abundance of sandy elements having little cohesion. Storms, rains, waterspouts, have acted upon it, and the material has given way in all directions; has been scored into thousands of hollows; has been swept into the bottoms of the valleys, especially along the Mangoro; or has been carried to the sea. I need scarcely say what a difficult country we found it to climb. The clefts of Ankay were about 150 feet deep.

Our last journey was also over a country perfectly new, untrodden (so far as we know) by a single Englishman till our friend Mr. Maynard took it, at our instance, three months before ourselves. The direction of the journey was N.N.W., which is the course taken by the Ikiopa and Betsiboka rivers, into which the province of Imerina is, to so large an extent, drained. It extended a distance of 230 miles, and occupied us 16 days. We travelled, as before, with our tents and canteens; but, with our baggage for the voyage home, our bearers were unusually numerous, and they made up their minds beforehand to make a good thing of the trip at our expense.

The descent by this route from the plateau of Imerina to the level of the sea is, in its upper portions, more gentle than on the east coast. We may reckon four or five broad terraces over which the road passes; the fall in the ground is moderate from one to the other; the path, as a whole, we found one of the easiest in the island, though the bearers complained that at certain parts the sharp quartz gravel cut their feet.

The first portion of the journey traversed the district of Vonizongo, which lies north of the parallel hills among which the Ikiopa runs, and is shut in by the great gneiss ridges of Lohavohitra and Ambohimanga. The southern portion of Vonizongo is full of valleys cut out by the streams from Lohavohitra, and is rich in water and its offspring, rice. The north has high bleak moors, among which are several beautiful valleys.

The villages are numerous, and the people have a strength and independence of spirit which have made them brave soldiers, good citizens, Christians of high principle and faithful martyrs.

Descending the moors by an easy pass over a red clay ridge, we went down into North Vonizongo, a valley 25 miles long. Enclosed by two lines of hills, east and west behind these hills, are broad clay moors, scored in all directions by the running waters, and all drained directly or indirectly to the west and north. The population became thin, and we could count every village as we went along. At the north end of the western line of hills is a noble hill of gneiss, Angávo, which gave us one of the boldest precipices we had seen in Madagascar. The waters had circled around it down the valley, and had cut out a vast bay in the clay deposits at its feet.

On one of these clay hills is the pass of Ambatomena ("red rock"), which gave us a second descent of 800 feet, on to the second terrace. This terrace was 48 miles long, and had a steady fall to the northward. It presented two parallel valleys drained by a stream, called "the wooded river" (Mánankázo), with great hills on the west; and it contained, in a line, five little towns, which are the Hova military posts. These posts serve (1) to maintain communication with the country to the north; (2) to protect the cattle herds, which feed on the unmowed pastures; (3) to ward off the possible attacks of the Sakaláva tribes who must enter North-west Imerina by this road. We found the people hospitable and kind; very glad, in their extreme isolation, to welcome a friend; and saw among them intelligent and earnest men and women, truly anxious to live thorough Christian lives. Toward the north of this section there were some noble hills; one of which, Andriba, separated two level and fertile basins, containing several villages, and presenting some beautiful clusters of the rofia palm. Between Kinajy, the first of these posts, and Malatsy, the last, the ground had fallen 1350 feet.

We had now finished the inhabited country, and were on the edge of a broad district, literally "no-man's-land." Our bearers had many fears of robbers, enemies, and Sakalávas. At the last village they cleaned abundance of rice, polished and sharpened their spears; and were greatly comforted in their minds when Mr. Jukes's empty gun was fastened outside one of our cases, and were told that, while Mr. Pillans headed our cavalcade, Mr. Jukes and I intended to bring up the rear. It took us two long days to cross this unoccupied territory, which had a width of some fifty miles; and they were days of great enjoyment. The country was perfectly wild: it presented to us long ridges, falling lower and lower, and becoming fewer; trending off to

the north-east, and leaving a broad rich plain clear to the sea: it gave us long valleys, grassy, green with shrubby vegetation, and well watered by small streams. During the first day, in a north-west course, we followed first one stream and then another, and crossed the low ridges between them. At night we pitched our tents on a pretty terrace above the River Andranobe; our bearers lit their fires upon the sandy bed. During the entire day we had seen scarcely a living thing—the silence, day and night, was most impressive; and it added to the charm of our position, that as the full moon rose in the east, the whole body of our bearers gathered around us for evening prayers, said a hearty Amen to the 91st Psalm, and sang their plaintive Malagasy hymn. Let none think that the days of romance have passed away: to me the realities of life are often more romantic and exhilarating than anything which fiction can invent or describe.

The second day of our wilderness journey we breakfasted by the light of a brilliant moon; and, as the sun rose, we came down over the edge of the hill-country, upon the river Ikiopa. It had been skirting our road all along a few miles to the west; it had been turned towards us by hard gneiss rocks; the long bend, at which we struck it, was full of green islands; and the river, a beautiful sight, was falling in creamy masses over a noble cataract, half a mile broad. Sixteen miles below the islands diminish in number, and at the town of Mevatanána the river becomes navigable for canoes. We now travelled inland, parallel to the river, and for several hours found no water. For many miles we traversed a wilderness of rubbish—the gneiss strata were tilted perpendicular; gravel and silt, silt and gravel, were spread out on every side, and great boulders lay half-exposed, half-buried. The reason was simple. This plain lay under the hills just where one of the great drains of the country had, for countless ages, deposited its stolen treasures. What the mighty earthquakes to the southward had rent and riven and overthrown—waterspouts, and storms, and floods had washed into these lower plains. In the afternoon we reached Mevatanána.

We were now approaching the sea-level; from this point our barometers fell 310 ft. Bembatooka Bay was yet 85 miles away; but the stream was rapid till we met the tides. For our further journey we hired canoes. At the end of the first day (Monday, August 3rd), we reached the junction of the Ikiopa and Betsiboka rivers; and pitched our tents on the sand-bank thrown up when the rivers are full. To us the spot was full of interest. In our travels among the Imerina Hills, we had traced and mapped many of the head-waters from which these rivers had sprung.

In the moor, near Angavokely, we had seen the fountains of the Mánanára, the Tsárasáhatra, and the Ikiopa; in the forest were the springs of the Varahina and the Sisaony; on the east of Ankarat were the Katsaoka and the Andromba. We had traced them over large tracts of country: here we saw their junction; and their united streams would bear us to the sea. The country was, in general, level, but it was covered by a few ridges through which the river cut its way. It was fresh and green everywhere. The air was warm and the vegetation largely tropical. Around us were grassy plains, gardens of plantain-trees, abundance of reed, and of the bamboo-cane with its spring leaves and feathery crown, while great tamarind-trees, huge mango-trees, or a few palms, stood out upon the undulations, or shared in the forest which clad the dark hill-sides. We now saw more animal life than in any other part of our travels. There were numerous small birds of gay plumage, blue and green; large flocks of wild ducks, small flocks of the paddy bird, the little white stork; now a heron flew up from the green brake; now we saw the flamingo fishing in the stream. But nothing could compare with the crocodiles. From the time we took to the canoes we began to see them: first in twos and threes; then in sevens and tens; at one time families of ten and twelve, and even twenty, were grouped together, sleeping in the sun; and at last, spread over a spit of sand, we found no less than forty. When we took to counting, this was the result. During the first hour we reckoned 105; during the next half-hour we reckoned 102; altogether, during the four days, we must have seen between 1600 and 2000 crocodiles. Some were babies, but some were of enormous size, full 20 ft. long, the knobs along their back forming large protuberances, and the girth of the body being very large. But they were timid, and when woke up from their lazy sleep, at once went and hid themselves in the water. We were told that they find abundance of fish in the river; they watch cleverly for the cattle when they come to drink, and they are destructive also to human life.

The rich and fertile district we were now crossing is occupied by a portion of the Sakalava tribes. They are not numerous: their villages are small and scattered. They live on fish, on rice, on their cattle, and on the produce of their plantain-gardens. They have few wants, and there is little trade. Mevatanána is the first of seven Hova towns, which are really military posts: they lie in a line along the river, and end at the port of Mojanga. We saw five out of the seven, and were most hospitably welcomed. At Mojanga we were picked up by the steamer *Malacca*, which had recently continued the line

from Zanzibar and Nosibé, and soon found ourselves on the way to Zanzibar and home.

The Malagasy people who inhabit this island of Madagascar are a single race. They are divided into three principal tribes, occupying different districts. The Betsimisàraka occupy the east coast, the narrow plain between the hills and the sea: their towns are small. From Tamatave to Mananzári, the twelve chief towns contain only 2000 houses and 10,000 people; there are small villages besides; but I doubt whether over the whole 200 miles we have more than 50,000, and over the entire coast double that number. The Sakaláva tribes take the entire west side of the island: they are broken up into numerous sections, with only local interests; and they are constantly at feud with one another. M. Grandidier can tell us much about them, as he lived long in their midst, and suffered greatly from their plunderings. The Sakaláva tribes near the outflow of the Mania are the people who have plundered the Hova cattle, and against whom was recently waged a petty war. They hold no terms with the Hovas; while others to the west of the capital, and those to the north-west, have accepted the Hova rule since 1824, and live in peace.

The Betsileo tribe are thorough Malagasy, and are akin to the Hovas. The Ibara are allied to the Betsileo: like the Betsileo, they live in "valas;" they speak like them, and seem to differ from them only in the mode of dressing their hair. The Hovas are the ruling tribe, who occupy directly all Imerina, Vonizongo, and Imamo; and indirectly the Sihánaka district, the north Sakalavas, the Betsileo province, and Betafo. All these tribes speak substantially the same tongue, are of the same tint and colour—a light olive—and have much the same customs. Differences and jealousies have existed between them for many, many generations. These probably originated in the fact of separate colonisations; in detachments from alienated sections of the same tribe; or in separate settlements of men and families belonging strictly to the same race. Two elements have, however, entered among them from without. 1. Ages ago, the Phœnician and Arab merchants from the African coast began to visit Madagascar. Bembatooka was one of their principal ports, and specially they seem to have had a continuous settlement at Mananzári and Matitanána. They were the first who taught the Malagasy writing, and specimens of their Arabic Malagasy were secured at Matitanána by M. Grandidier. They taught the Malagasy the division of time by months; they gave them also the names of the days of the week—Alahády, Alarobía and Zoma: scales for weighing money are *Mizán;* and doubtless from them they learned the rite of circumcision.

2. With the Arabs also came a slave-trade—from the island to the island. In the course of generations thousands of Africans, Swahilis, and others, have been introduced into the island. The blood of many Hovas is mixed with African blood—the thick lips and the crisp, curling hair show it. There are also thousands of slaves in the island, pure Africans, as well as thousands of Hova slaves. With exceptions of this kind, which are soon accounted for, the Malagasy races are one. Their language is one—an offshoot of the Malay: a fact proveable by (1) inflections; (2) by the peculiar reduplications; (3) by special forms and uses of participles; and (4) by a multitude of the most important words.

As a people the Malagasy are not far advanced; their almost complete isolation from the world at large has greatly retarded their progress. They are thoroughly tribal in all their institutions still. They are clans in form, as well as in spirit. The Prince is their chief, officially the owner and lord of all they have and all they are. All obligations are paid by feudal service; officers are remunerated by lands, and by the assignment to them of the service of so many inferior men. No salaries have been paid in money till recently: everything has been paid in service or by gifts in kind. The hump of every bullock killed belongs to the Queen. Rice, sugar-cane, lámbás, fire-wood, cattle, stones, are all delivered as part of that service.

Things are far behind. But they are a kindly people, an orderly people, a loyal people. They have a great affection for their Queen; and the Queen (who is an excellent Christian lady) has a warm affection for her people. An intelligent people—they have learned much from their English friends, and are improving daily. There are more than a thousand congregations among them; some three hundred thousand of them are more or less under instruction; and many thousands prove, by their example, that they are not only intelligent, but sincere. I add this fact, because I cannot doubt that the Fellows of this Society care for the earth, its resources, and its form—not merely for itself, but because it is the theatre on which human character is developed, human events take place; and the tribes and nations, great and small, by which it is peopled, benefiting and blessing each other, work out the will of God respecting all.

V.—*Discoveries in Eastern New Guinea, by Captain Moresby and the Officers of H.M.S. Basilisk.* By Captain J. MORESBY, R.N.

[*Read*, February 22nd, 1875.]

IN November, 1873, a Paper of mine, giving a brief outline of H.M.S. *Basilisk's* work in New Guinea, was read before you by your esteemed Secretary, Mr. Markham.* Since then I was sent in command of an expedition to substantiate and follow up that work; and this Paper will give you, I trust, a summary of the results accumulated during these two cruises.

I confess I am amazed to think that the very outline of the third largest island in the world should have been unknown till now, and the navigation between its north-east coast and Australia invested with such imaginary dangers as to prevent communication between these shores.

I will first now endeavour to show you what I have accomplished, in conjunction with my able assistants, Lieutenant L. Dawson, Admiralty Surveyor, Lieutenant Sydney Smith, Navigating-Lieutenant Mourilyan, and the other officers of the ship; and secondly, give you the information we have been able to gather concerning the natives.

In brief, then, we have proved that East New Guinea ends not in a wedge, as hitherto imagined, but in a huge fork, the lower prong of which is cut up into an archipelago of islands. Between these new islands and the peninsula which forms the northern prong a sheet of water lies, about 45 miles deep and 12 to 18 in breadth, named by me Milne Bay.

This new archipelago consists of about sixty islands, large and small. Of these the largest, Moresby Island, is about 36 miles in circumference; Basilisk Island nearly as large; Hayter and Heath Islands somewhat smaller; many of the remainder being from 4 to 12 miles in circumference, and inhabited. These islands are mostly lofty and volcanic, and richly wooded.

Moresby Island, a fair type of the rest, rises boldly from the sea to a height of 1600 feet, rich in fruit-bearing and timber-trees, whose dark tropic green is relieved by the various earth-tints of the cultivated and terraced land, and the lighter greens of yam and taro. Here and there the eye rests on great grassy slopes that look like English meadows ready for the scythe; but a giant scythe, indeed, would be needed to cut them, for this grass is 12 feet high. We found it very difficult to make our way through to reach a good look-out from above, and the only plan that succeeded was for the leading man of the party to throw himself bodily forward and press the grass down with

* 'Journal of the Royal Geographical Society,' vol. xliv., p. 1.

his dead weight. We relieved each other frequently at this duty, but still found it exhausting and most unpleasant, as we bled all over from the sharp grass. On the shore are scattered the most singular dome-shaped grassy hillocks, which made for us natural surveying stations. At the water-line the shore is broken into fine deep-water bays, some five of which are good harbours. Villages cluster to the edge of the calm waters, and here and there a coral-reef runs out, from which the dusky fishers ply their task.

I would I had the power to tell you of the glorious panorama which greeted us from the top of Glenton Island, the summit of which we had cleared with immense labour from its giant forest-trees, that the tiny theodolite might sweep an horizon never before gazed on by our race. Six hundred feet below us, almost as the plumb drops, the light waves curled on a snowy coral-beach. To the west the wooded peaks of Moresby Island closed the view; but on every other side island after island floated on the bosom of an intense blue sea, some volcanic, lofty, and rugged, others coralline, low, white, and covered with graceful trees, with every variety of form and tint, of light and shadow, in the nearest ones, whilst those beyond faded out as they distanced into dim shapes, faint clouds—very dreams of islands—giving one a sense of the profusion of creative power that was almost overwhelming.

The *Basilisk* has had the honour of fixing the position and laying down the coast-line of the D'Entrecasteaux group. These islands were seen from a distance by D'Entrecasteaux 94 years ago, as he sailed in search of La Perouse; but he never visited them, and he saw them on the east side only.

We have proved them to consist principally of three large islands, separated by narrow straits from each other and the mainland of New Guinea; and as their first surveyor and visitor, I have taken leave to name the islands Normanby, Fergusson, and Goodenough; and called the straits Ward Hunt, Goschen, Dawson, and Moresby. These islands extend north and south about 90 miles, and afford harbours and anchorages.

With your permission, I will give you a slight account of this survey. Lieutenant Mourilyan and I, with an engineer and seven men, started on March 7th in our steam-pinnace. with a whale-boat in tow, loaded with fuel and provisions for a week. We left the ship in Dawson Straits, and steaming to the westward we passed close under the high volcanic mountains of Fergusson Island which bound the strait to the north. The shore that we coasted was dotted with villages high on the hills, peeping through the sombre tropical green. We could see that our appearance caused great excitement amongst the natives,

who must have thought us gods moving rapidly on the water without exerting an effort. They raced for miles along the beach inviting us to land (but we could not accept their invitation), shouting their cry of surprise, "Hōō-ee! hōō-ee!" Turning the western point of Fergusson Island, we found ourselves at the entrance of a fine strait separating Fergusson from Goodenough Island. Both these islands, with their forests topped by bare grey peaks, are grandly picturesque objects, Mount Goodenough rising magnificently to a height of nearly 8000 feet. The sides of this great mountain are cultivated in patches to a height of about 2000 feet; gradually its woods give place to barrenness, and its summits stand bare and knife-edged against the sky. Mountain torrents dash down its ravines and flash out at times from their dark-green setting, like molten silver.

Night now closing, we sought to anchor between a small islet and the shore; our draught of water was but 12 or 14 inches, and yet we could obtain no anchorage; the channel was full of mushroom-coral, which rose like great pillars from a depth of 20 to 30 fathoms to within 3 or 4 inches of the surface, so close together that after many a weary trial, off the entrance of lovely coves and delicious-looking bays, we had to seek a precarious anchorage in 20 fathoms' water outside these coral pillars, on which a dangerous surf was breaking.

The natives then crowded alongside us: but we were weary and wanted to have our evening meal in peace, to obtain which we blew the steam-whistle, and their consternation was absurd in the extreme; they seized their paddles and glided off into the darkness. All night long the near village clamoured like a frightened rookery, and our look-out men were frequently startled during the night by natives stealing out on the reef to within a few feet of us. At last some sleep being needful, I caused a rifle to be fired to seaward, and this secured us some quiet. Next day we failed for want of fuel to completely circumnavigate Goodenough Island. We landed on it and found it the home of the megapode and a variety of exquisitely-plumaged birds, unknown to us; also of parrots and lories.

Passing back to Fergusson Island, we landed at a large village in Moresby Straits. Strangely enough, for we saw no such thing elsewhere, the men hid themselves, and an old lady, with a very pleasant face, paddled off to us in a catamaran; we gave her strips of red cloth, and she became quite friendly. When we landed the married women alone advanced to us, the men appearing, but keeping back in evident timidity; but the presents distributed amongst the women soon brought the men about us, all anxious to exchange their stone-axes for our rusty

iron-hoop. So entire was my confidence in the peaceable disposition of these people that, accompanied only by a seaman, I visited their inland plantations, and found large enclosures well fenced in with bamboo, producing tropical fruits, yams, sweet potatoes, Indian corn and sugar-cane. The sago-palm grows most abundantly here; and the natives mash the sago in immense troughs, which I at first took to be worn-out canoes. We all enjoyed this food, and used it largely.

The good feeling of these natives deserves particular mention: they had never seen the *Basilisk*, and knew nothing of our possessing superior arms. We were only ten men amongst hundreds, and they knew that we carried iron-hoop on our persons, a thing of priceless value in their eyes; but not only did they respect our position, but they helped us over obstacles, showing us the best paths, and took care of our clothes when we bathed in their cool streams. Here, a mile from the beach, I saw large masses of coral-rock cropping up at perhaps 100 feet above the sea-level in close vicinity to volcanic cliffs. There was a singular absence of coral-formation on the north side of Fergusson Island; and the beach and bottom of the sea, formed of black volcanic sand sloping gradually into deep water, offered many valuable anchorages. No natives lived on this part of the island, and we could not find any fish in the bays, but a wallaby was shot near the beach. We discovered here a number of boiling mineral-springs, strongly alkaline; they united themselves in one large rivulet, which offered any degree of temperature to our bathers. Other hot springs may exist here at the bottom of the sea, which would account for the absence of fish in the bays. In the sand and mud thrown out by these springs we found very small specimens of rubies and amethysts, evidently chippings from larger stones.

Our return to the ship was very arduous work; we had heavy weather and were out of coals, but by burning wood and greased coal-bags we succeeded in getting back.

Now, with regard to the great Louisiade reefs, I must say a few words. Our work here has proved that these reefs, hitherto deemed an impenetrable barrier between Australia and North-East New Guinea, present, in reality, a wide open gateway, through which ships may safely pass from the one to the other, and enter on a shorter course to China. Previous to this discovery three routes lay open between Australia and China. Of these the shortest, or New Ireland passage, ran inside the Solomon Islands, and leaving the Louisiade Archipelago to the west, went between New Britain and New Ireland, and so on to China. Our new route lies to the west, instead of the east of the Louisiade reefs, and shortens the dis-

tance by about 300 miles, without, to my knowledge, increasing the danger. Eventually the trade with China will be carried on by steamers, and this, the shortest route, will doubtless be *the* route. Near Teste Island the Louisiade reefs sink from the surface to a depth of 10 or 12 fathoms, and so continue for more than 100 miles to the west.

To the immediate west of Teste Island ships bound by this new route pass over this sunken barrier; and here Nature has placed such striking landmarks that a land-fall can be unmistakably made. Teste Island is easily recognisable. Its peaks rise to a height of 300 feet, and look like islands at a distance. Four miles to its west stands Bell Rock, a great dome-shaped mass of rock, rising perpendicularly from the sea to a height of 500 feet, wooded over wherever a crevice affords room for a tree to grow, and marking well the entrance to the new route: it may be passed by a vessel within a stone's throw. Thence, as the ship passes between Moresby Island and Engineer's Group, not a reef lies in the way. To the north-west of Slade Island the passage lies between two reefs about 2 miles apart, and a passage of 4 miles' breadth leads to the point of exit between Cape Ventenat and a reef which I have named Gallows Reef. The channel here is 2 miles wide; and Gallows Reef being awash, and marked by two tree-covered islets, affords sailing-marks which remove all danger to the navigator.

Another useful gift which the *Basilisk* has been able to present to the mariner and the merchant has been the discovery of harbours on these once inhospitable coasts. I cannot trouble you with a description of these many new harbours, but will speak of a few.

1. Robert Hall Sound, South New Guinea, in lat. 8° 50′ S., long. 146° 35′ E., is well marked by Yule Island at its entrance. I have a great belief in the future of this noble sheet of water, seen from seaward by Captain Owen Stanley's survey, but never entered till now, by a passage we have found off the south-east end of Yule Island. A good, safe, clear channel leads in, and the harbour is perfectly protected, and land-locked with deep water, for hundreds of ships to lie safely. Its shores are low, swampy, and mangrove-covered, and probably unhealthy; but Yule Island, near which ships would anchor, is high and healthy ground. At the head of the harbour Hilda River issues, navigable for steam-launches, but too rapid for row-boats to ascend, destined in time to bear the valuable woods and many products which here await the advent of commerce downwards on its rapid bosom.

2. Port Moresby is a safe, commodious, double haven, lying 60 miles to the east of Robert Hall Sound, at the point where

the swampy coast first gives place to coral, white sand and shells. Truly this harbour was "the desire of our eyes;" and when, after much search in open boats, we discovered this harbour from Jane Island, we were very joyful. Then the great anxiety arose as to whether we could find a good entrance; and for two days more we sounded in our little galley and cutter, far away from the ship, inside the great barrier-reef, to find an entrance. Suddenly I dropped my lead 50 fathoms down, and finding no bottom, knew that the entrance was found. Two days after we took the ship in. The outer harbour of Port Moresby is an extensive bay, surrounded by open, grassy, round-topped hills, thinly timbered with the Australian gum-tree, whilst rich tropical valleys lie between. There are several large native villages on its shores. Jane Islet, about 500 feet high, lofty and precipitous, wooded and cultivated, stands in the centre of the outer harbour, and if fortified would render it impregnable. The eastern waters are a mass of coral-reefs; but the western are clear, and just the right depth—9 to 12 fathoms—for anchoring. A fine, clear passage leads to the inner, Fairfax Harbour; and in this inner broad sheet of water, shut round by high land, the *Basilisk* anchored in 5 fathoms. On its southern side from the hill under which she lay a considerable quantity of gold-quartz was taken, specimens of which are here for your inspection. We were too busy surveying to prosecute this discovery; but, as I have before stated, the aspect of the land, and character of the masses of granite-quartz cropping up, lead me to think that gold will be surely found there. This port, from its healthy situation, has already been selected as the principal station of the London Missionary Society.

3. Pitt Bay is a fine harbour, and easily entered; it lies at the gateway of the New Australo-Chinese route at the east end of Moresby Island, embosomed by lofty hills. Hereafter the power holding Pitt Bay will possess the key of the route. At Pitt Bay we took one piece of gold-bearing quartz from the bed of a stream, but though we searched diligently, we could not find a second.

4. Traitors' Bay, on the north coast of Eastern New Guinea, in lat. 8°, and long. 148° E., offers shelter to ships trading on that coast, and possesses a navigable river with a gentle current. This river discharges itself outside the anchorage, over a bar that proved impracticable to our boats. I regret much that I had not time to survey this river, for it seemed to me to lead far up into the country, and I hope some future explorer will follow it up. It needs no words of mine to show you how important it is that this great country should be opened up by water-communication.

Running Survey of the North-East Coast.—Our last work was the running survey of the unknown coast of North-East New Guinea.

On April 27th we joyfully turned the *Basilisk's* head westward, for every mile was now a step towards home.

The first striking difference between these northern and the southern shores of New Guinea is that here there is no outlying barrier-reef, and the shores, instead of shelving outwards, are steep to. The mountains here generally run down to the sea, then follows a shore-reef, from which the plumb-line may be thrown into 50 fathoms of water.

The coast-line is but little broken up, and affords few harbours and anchorages. Speaking generally, from East Cape to Cape Cretin the coast-line may be spoken of as a series of bold headlands, running out 20 or 30 miles to seaward, with deep bays between; this configuration increased our work threefold.

The great Owen Stanley Range may be said to terminate at the head of Milne Bay, but one of its spurs, named by me "Stirling Range," runs at a diminished elevation through the narrow peninsula which terminates at East Cape. This henceforth important promontory on the world's map has no great feature to attract attention. The peninsula has gradually narrowed to half a mile in width. The Stirling Range has ceased, and been succeeded by a low, undulating forest-country, sprinkled with villages, when suddenly an abrupt double-topped hill springs to a height of 300 feet. There is a village at its foot, half-hidden in groves of bread-fruit and coconut trees. Its summits were crowned with tropical forest when first we saw them; but these noble trees fell to our axes, as we made this a theodolite station. A narrow boat-channel separates the cape from two low coral islets, and 10 miles further to the eastward, on the opposite shores of Goschen Straits, rises the dark, frowning mass of Mount Prevost, on Normanby Island.

This, then, is the East Cape, and real eastern terminating point of New Guinea. From East Cape to Cape Moresby, as the crow flies, the distance is about 130 miles, with a depth of 500 to 600 fathoms, and muddy bottom at about 2 miles from the shore. Villages abound here; and the valleys between the hills, and not seen from the sea, are richly cultivated.

Between Cape Ducie and Cape Frere the forest ceases, and is succeeded by an openly wooded level plateau full of villages, backed 2 miles inward by a range of abrupt grassy hills, bare of wood, each defined by a belt of sharp brushwood at its base, crowding down hill upon hill with such a curious effect as to remind us strongly of the plate in Black's Atlas of all the mountains in the world. Above the height of 2000 feet the

forest springs up again, and covers still higher peaks to the very top, to a height of 6000 or 7000 feet.

Cape Frere is a noble headland, dropping its huge buffalo-headed mass about 2000 feet almost perpendicularly to the deep-blue sea; and the *Basilisk* looked a mere cockboat in the huge shadow, as almost scraping her sides against the beetling mass she stood in to seek for an anchorage in Bartle Bay. This bay—at the head of which an extensive tract of comparatively low land, marked by terraced plateaus, between which a considerable stream debouched through a dark sandy beach—seemed to afford the certainty of a good safe anchorage for the night; but we were doomed to disappointment—nowhere within a cable's length of the beach would 80-fathom line reach the bottom. At last we let go anchor in 49 fathoms (which is deeper than the water of the English mid-channel), our stern just swinging clear of the beach. The soil about Bartle Bay is very rich, and runs back in a series of clear-terraced elevations to a lofty inland range of mountains. The river which issues at the head of the bay has ploughed deeply through these terraces, so that its banks are exposed for a section of from 10 to 30 feet in height; they are composed of smooth water-worn stones, imbedded in a light gravelly soil. We searched but could find no gold here, nor was any trace seen by us of the precious metal on the north coast of New Guinea.

From Bartle Bay into the bight of Goodenough Bay, a distance of some 30 miles, the bold and fertile coast runs in a W.N.W. direction. There are some fine waterfalls at the head of this bay, flashing down the dark-green mountain-sides, and so much river-water is here discharged that the surface of the sea is quite fresh. The canoes about here are smaller; and quite a different language prevails from that at East Cape.

From the bottom of Goodenough Bay the land turns abruptly in an E.N.E. direction, and so runs boldly out to sea for 30 miles in a rich forest-covered promontory, which ends in grassy slopes marking Cape Moresby, off which are small outlying islands, surrounded by coral-reefs. From this point, looking across Ward Hunt Straits, we could still see Mount Goodenough rearing its stupendous mass.

From Cape Moresby the land trends W.N.W. for 45 miles to the bight of Collingwood Bay, the shores of which are low and densely wooded, and the depth of water decreased to 50 fathoms at 2 miles from the shore. From this point the natives became suspicious and unfriendly, and we experienced much difficulty in communicating with them. In Collingwood Bay we cut a large quantity of firewood from the tall, fir-like trees which generally ornamented the points of land. The land now runs

north-east for 45 miles till it forms a noble promontory, and terminates in Mounts Victory and Trafalgar, 3000 feet high, and Cape Nelson—names which I rejoiced to write for perhaps the last time on the map of the world. The natives here fled at our approach; and we observed that, although belonging to the light-coloured race, they differed in appearance from the natives of East Cape, and wore their hair in long, thin, ugly ringlets.

Cape Ward Hunt lies 40 miles to the westward of Cape Nelson; the deep bay between I have named "Dyke Acland." Its low wooded shores, with the formation so characteristic of this coast, suddenly turn to the north-east and form a bold wooded promontory. Eight miles to the westward of Cape Ward Hunt is Traitors' Bay. Here I had occasion to fire my first and only shot in self-defence. Three of our officers had strayed away from a wooding-party, when from the ship we observed a party of 70 or 80 warriors land from their canoes, fully dressed in feathers and war-paint, stealing on them. Sub-Lieutenant Shortland and I jumped into the dingy with some spare rifles, and gained the beach just in time to put our shipmates on their guard and give them the rifles. Hoping to maintain friendly relations, I advanced alone, armed with a rifle, but holding my arms over my head, towards the bush where the natives were lurking, quite concealed from our view. Suddenly they sprang from the bush to the open beach, and formed in two regular lines, 10 yards in my front: the first line armed with spears, which they held quivering to throw, whilst they moved with a short quick step from side to side to distract our aim, guarding themselves with shields; the second line was armed with clubs. For some seconds I forbore to fire, hoping still to preserve the peace. Finding this hopeless, and that in another second I should be the target for fifty spears, I fired with a snap-shot at the leading savage; the bullet pierced his shield and spun him round on his heel, but glancing off, did not wound him. Immediately the whole body of warriors turned in consternation at the sound of firearms, then heard by them for the first time, and ran for the canoes. We followed till we drove them on board, firing a few shots over their heads.

Passing Cape Ward Hunt we came upon the position assigned in the charts to "Riche Island," so named after the naturalist of D'Entrecasteaux's expedition 94 years since. No trace of any such island now exists. It is probable that D'Entrecasteaux, at a great distance, saw the high land about Cape Ward Hunt, which would then appear as islands, and thus he noted it on his chart.

Huon Gulf lies between Cape Ward Hunt and Cape Cretin,

and is the last of the great bays which distinctively mark the north-east coast of New Guinea. Its shores are well populated, and the natives were friendly. For the first time in New Guinea we observed tappa-cloth used; they wore it round their waists, and made into high conical caps, which gave them all the appearance of Indian Parsees. Its shores are covered with a rich vegetation; and especially beautiful are the slopes of the Rawlinson Range, teeming with palms and tree-ferns, and well inhabited. From Cape Cretin to Astrolabe Gulf, a distance of 120 miles, the land trends nearly due east and west, without a break; the coast-line is backed up by the great Finisterre Mountains, the two highest peaks of which, standing facing each other, I have named Mount Gladstone and Mount Disraeli. At Astrolabe Gulf our survey terminated; but off the northern shores of New Guinea we took a series of deep-sea soundings, finding from 1500 to 2000 fathoms 25 miles from the shore, a depth probably unequalled in any part of the world in such close proximity to the land.

The *Basilisk* passed from Astrolabe Gulf towards Lesson Island, an active cone-shaped volcano discharging large volumes of steam and smoke. It is densely populated, and the cultivation at its base appears very rich. The natives, a fine-looking race, crowded alongside the ship, eager to barter all they possessed for scrap-iron. Their hair is worn in a preposterous manner, confined behind in a conical case projecting 12 or 14 inches, as a horn from the back of the head. Off Garnet Island the *Basilisk* passed through a large body of brackish water, forcing itself seaward and bringing with it vast numbers of gigantic uprooted trees. From this fact I conclude that a river of large dimensions must exist in the neighbourhood of Cape Della Torre.

Time will not permit me to say more. On June 2nd we reached the Dutch Spice Island of Amboyna, having thus successfully completed the survey of the last unknown coast of the habitable world.

The meteorology of Eastern New Guinea appears to be different from that previously supposed. The north-west monsoon blows from November till March, accompanied by occasional westerly gales, with fine weather intervals. The south-east monsoon, which follows, we never found to blow continuously up to the time of our leaving the coast in May, for we experienced light variable winds and calms; whilst on the northern shores of Eastern New Guinea the south-east monsoon appears to be altogether arrested by the lofty Owen Stanley Range, the summits of which, during the month of May, were observed with heavy clouds, leading us to believe that the monsoon was

blowing strongly on the southern shores of the peninsula, whilst we on its northern side were sailing in calm and waveless waters.

The barometer showed little or no fluctuation, remaining steady between 29·80° and 29·90°; the thermometer in the shade varying from 83° to 86°. The tides varied in rise and fall from 8 to 12 feet.

The Natives.—Having now, as far as time would permit, treated the geographical part of my subject, I will speak of the native race which inhabits the newly-discovered portion of New Guinea. You are already aware that varieties of race exist in this great island. You know of the black Papuan who inhabits the south coast of New Guinea, apparently from Cape Valsch to Cape Possession in the Gulf of Papua. A recent Italian explorer has lately informed you of the existence of a hitherto unknown race, named Arfaks, inhabiting the mountainous parts of north-western New Guinea; and to these we must add the pure Malay race, which, coming from the isles of the Malayan Archipelago, has driven inland the aborigines of the north-west coast, and settled in their stead, as a third type of man. This last is, as you are aware, a semi-civilised Mahometan race, professing Dutch allegiance. Leaving these people, I will introduce to you a fourth—our now first visited race of Malays.

This race is distinctly Malayan; but differs from the pure Malay, being smaller in stature, coarser in feature, thicker lipped, with less hair on the face, being, in fact, almost beardless. The hair of the head is also more frizzled, though this may result from a different dressing. These men have high cheek-bones like the pure Malay; their noses are inclined to be aquiline, and sometimes very well formed; their eyes are dark and beautiful, with good eyebrows. Amongst them we met many men with light hair, and what struck us as a particularly Jewish cast of feature. They rise to a height of from 5 feet 4 to 5 feet 8 inches, are sinewy, though not muscular, slight, graceful, and eel-like in the pliability of their bodies. This race abuts on the black Papuan, somewhere in the vicinity of Cape Possession; but I do not believe that a fixed line of demarcation exists, for in Robert Hall Sound both types of race were present, and the natives varied here amongst themselves in colour, stature, and cast of feature. A mixture of habits also obtained at this point, which confirmed the idea of a fusion of race here. Some chewed the betel-nut Malay-wise, whilst others rejected it; some wore the Papuan adornment of the great bill of the hornbeak as horns on the head. All were destitute of the ornaments made of human bone generally worn by our newly-found Malay race, whilst they one and all decked

themselves with flowers and berries as this race does, but the Papuan never, to our knowledge.

This new race, which presents some slight varieties in itself, appears to inhabit the whole of the eastern peninsula of New Guinea in its northern and southern shores, from about 148° of longitude, to East Cape, which is in 150° 53′ East longitude, and also the newly-discovered archipelago of islands adjacent. I approached these people with caution, knowing that no seamen had ever willingly ventured near their shores, and kept prepared for attack; but veiled my precautions, showed no distrust, and went freely amongst them. Had I been so unhappy as to have needed firearms, I should have used them with full effect, believing this to be the truest mercy; fortunately these kindly people were soon won, and greeted us everywhere with a wondering welcome. Nearing shore I always caused a seaman to stand upright in the bows of the boat, with both arms extended in sign of peace; and we landed two or three only at first, with no arms but the revolvers hid in our breasts, making gestures of friendship. Soon they smiled, and made responses to our signs; drew nearer and touched our white skins, turning up our sleeves and trousers to see if this amazing white colour held all through; and we gave them gifts and soon got to bartering, in which they showed great honesty. The young women, some of whom were really pretty and graceful, were particularly curious about us; but if we ventured to touch their dark shapely limbs, they fled away with a start and a scream, and seldom returned. These natives are not devoid of principle, I am sure. I once attempted to barter an axe with a boy for a handsome shell-necklace he wore. He made signs that the necklace was not his, and refused to trade; his companions urged him vehemently, even trying to force it off his neck, and at last so far prevailed that he took the axe from my hand and half-unfastened the necklace. Conscience pricked him, and he hurriedly thrust back the axe, and making signs that he would go and get leave from the owner to sell it, he paddled off in spite of the jeers of his friends.

When the *Basilisk* first discovered Moresby Island, and cast anchor in Hoop-Iron Bay, we could see the natives on shore rushing frantically about: finally a fleet of canoes, containing men only, came off and hovered about us, showing no arms, but wearing bird-of-paradise plumes, and handsome shell-disks on the side of the head. These disks they shifted to their hips when once convinced of our pacific intentions. I have a heartfelt pleasure in stating that all our subsequent intercourse with these people was marked with good feeling and kindliness on both sides. Their single evil propensity seems to be a love of pilfering; and it was amusing to see their skill in hiding small

articles in the large orifice they made in the lobe of the ear, or between the tight ligatures they wear as belts and armlets, and their skin. They steal skilfully also. Having adroitly knocked some nails or an instrument off the carpenter's bench, or secretly unscrewed a nut, they would walk over the side, concealing it under the hollow of the foot. I thought it wise to overlook these small delinquencies; but on one occasion they went a step too far. H.M.S. *Sandfly* (under my orders), when lying in Possession Bay, had sent a boat on shore with four men for water, and the natives had stolen their water-barricoes and boat's crutches, and all the iron-hoop they had about them. I directed Lieutenant Fowell to lay an ambush and seize some natives; and two were secured accordingly, after a long struggle, in which their smooth skin and supple limbs eluded the attempts of our strong seamen. They were taken on board the *Sandfly* and kindly treated, but evidently expected instant death. Their wives and friends came off weeping, and offering presents to buy them off. The natives deserted the ship, and kept close to the shore in their canoes ready for flight into the bush: however, I went amongst them in a dingy, and succeeded in making them understand that our prisoners should be liberated on the restoration of the stolen property. On the second day the articles were brought back, and we released the men, to the intense delight of their friends, who then sent a large hog on board the *Sandfly* to show their gratitude. A few days afterwards our carpenters, working over the ship's side, missed a saw, but before we could take any step, we beheld a large canoe coming off in which an old man stood holding up the saw, and on reaching us he returned it, and expressed his anger at the theft.

I incline to the belief that these people have not any religious feelings. They certainly have no external form of showing such, or we should have observed it; for with the same limited opportunities of observation we distinguished many observances as distinctly religious at all the other South Sea Islands visited by us. For instance, at the New Hebrides there was an organised system of devil-worship, with duly-appointed priests and rites: idols also were everywhere to be found. Here, however, no idols were to be seen. Occasionally grotesque nude figures were painted in red and white ochre on the ends of the houses, but for ornament only. One action only seemed to have a religious tendency, namely, their universal custom of bringing a village dog and dashing its brains out in our presence, after which ceremony they showed perfect friendliness. We noticed, also, that in every village an old woman, much bedizened with ornaments and ropes of shell-necklaces, seemed to hold a certain sort of authority.

They bury their dead in a respectful manner in the ground, and build small thatched huts over them, on which coco-nuts were hung. These coco-nuts, hung plentifully in the villages and even far out on the reefs, may have been votive-offerings. In some few cases these burial-huts are rudely carved and fenced in with a bamboo palisade, as if the resting-places of chiefs; but we saw no sign of chieftainship amongst the living.

These Malays must be considered a more civilised race than the Papuan; they possess the art of pottery, still unknown to the Papuans. In every village women may be seen moulding the clay, whilst others tend the wood-fires in which the globed jars are baking. They are also better cooks; for they boil their food, as well as roast and bake it like the Papuans: and I have frequently enjoyed the vegetable porridge they make of yams, taro, and mangrove fruit stewed in these bowls, with coco-nut shred finely over.

As fishers they far exceed the Papuans in art: the latter fish only with hook and line and the barbed spear, whilst our new friends make fishing-nets of various sorts with great skill; one, like the English seine, made with the fibre of a small nettle-like plant; another is what I call a "trap-net," and consists of a netted bag, with the mouth kept open by a bamboo-spring. It is let down with the bait in the bottom, the mouth open. The fisher, on feeling a fish, pulls a string which closes the bag and draws it up with his prey.

The Papuans have but one kind of canoe, dug out of a single tree and balanced by heavy out-riggers; but these people have several kinds of canoes, of which the trading-canoe is best, having topsides laced on with split bamboo, strengthened by strong knees inside, supporting a sort of half-deck, under which they stow their goods. They are most ingenious basket-makers, and make strong good-looking baskets to fit one inside the other in a nest: they also make capital woven-bags for carrying their property; and they make light rope and strong cord from various vegetable fibres, that would not disgrace an English rope-yard.

Their weapons consist of stone tomahawks, clubs, and axes, and of spears, and heavy wooden swords and hair-slings; and that these weapons are not very effectively used Lieutenant Deeds, of the *Basilisk,* had ocular proof, as he witnessed a fight between the Slade islanders and those of East Cape and Moresby Island, whilst detached on a surveying cruise. The combined warriors of East Cape and Moresby Island approached Slade Island in some twenty canoes, containing about thirty men each, but remained thirty yards off shore, throwing spears and slinging stones at the Slade Islanders, who waded out to meet them,

and returned the compliment. They maintained this respectful distance for two hours, when they drew off and nobody seemed wounded, such was their skill in dodging these missiles. We rarely saw a wounded man amongst these people, and but few enemies' skulls ornamented the outsides of their houses.

Their houses and those of the Papuans do not differ materially. They are built on poles, sometimes 12 or 14 feet from the ground, and consist of one large tunnel-shaped room, well thatched over. A pole, with notched steps, leads from the ground to a small landing-place or verandah, behind which is the small opening leading into the interior. This verandah is the favourite lounging-place of the family; and their implements of war, fishing, and labour, are carefully hung round on the inside walls.

They are rude but successful cultivators of the ground, using stone mattocks for turning up the soil to a small depth, preparatory to planting their yams and taro. Their food is very plentiful, and consists of fish, yams, taro, fruits, and pork on great occasions, with abundance of the delicious crabs which abound here, and they do not make any kind of intoxicating drink. This plenitude of food may have some influence in checking a desire for cannibalism, which certainly does not prevail largely amongst them; though from the fact that we saw some of them wearing bracelets of human jawbones, and necklaces made of the spinal vertebræ, which had evidently been subjected to the action of heat, coupled with some signs they made us, we suspected that cannibalism was not wholly unknown to them.

These people are affectionate to their children: they make toys, especially models of canoes and small spears, to amuse them and encourage them to have pets. The little ones were constantly to be seen petting little pigs, with which they ran off at our approach, lest we should barter for them. They had also multitudes of tame parrots, lories, cassowaries, and kept several varieties of the marsupial cuscus in cages. In some cases the parents were willing to barter their children for our iron axes.

They did not (like most savages) keep their wives in the background, but allowed them to meet us freely and have a voice in the trading. On one occasion a husband was heartily belaboured by his wife with a paddle on the head and shoulders, because he did not barter satisfactorily, and his friends, instead of interfering for his relief, only shouted with merriment. He did not retaliate, but looked foolish. Nevertheless, the lot of the women here is to do all the heavy labour, whilst the men fight or fish, as in all other savage communities.

The men are but slightly tattooed, but the women tattoo all over, sometimes in graceful patterns. The men paint grotesquely

with ochres, and sometimes shave the head, and paint it, and the whole body to match, of a shining black, with charcoal and coco-nut oil. The women crop their hair short, the men wear theirs long and frizzed, and all disfigure their mouths with chewing the betel-nut, except the younger women. The men wear a waistcloth only, the women the usual South Sea garment, the short grass petticoat or "ti-ti."

A New Guinea exquisite, lithe, dark, and graceful, with shell-anklets, making his small feet seem still smaller, is not an unpicturesque object. His waist is braced in with many turns of black cord, the outside of which is plaited in with gold-coloured straw; his neck is bright with a red shell-necklace, from which a boar's tusk depends, and from the tight ligatures and bracelets on his arms the graceful pandanus-leaf flows far behind, curiously embroidered. Bright red flowers and berries adorn his hair, and his face is frequently painted red at one side and black and white at the other.

The only maladies we perceived amongst them were elephantiasis, ulcers, leprosy, and other skin-diseases; otherwise they were vigorous and healthy.

In conclusion, I am anxious to take this opportunity of expressing my grateful sense of the exertions made by the officers of H.M.S. *Basilisk* during both our New Guinea Surveys. Their work was continuous, arduous, and frequently exhausting, from circumstances of climate, exposure, deprivation of comforts, and physical efforts of all sorts. No one thought of rest; all felt that a really stupendous task had to be accomplished within the limits of a comparatively short time, and laboured heartily to achieve it.

I think we all felt that English hands only ought to finish the work of Cook and Dampier in this quarter of the globe, and that it was well to establish for England a right on these shores, knowing that such a right will become of importance in the ut ure.

Having been long in Australia, we naturally felt a growing interest in the future of the great Australian Colonies, and were struck with the importance of keeping them unhampered by any complications that might result from the establishment of foreign settlements within so short a distance of Cape York.

To this end we desired to ascertain if harbours existed on the coast easy of access and possessing strategic advantages. Our secondary desire was to throw the riches of New Guinea open to Australian effort, and so lead to the mutually helpful union which Nature intends between the sister islands of Australia and New Guinea. Providence has crowned our efforts with success, and time, which tests all things, will, I know, prove our

work to be good and useful. In this thought we must find our reward.

NATURAL HISTORY REMARKS.

I do not feel that I am in a position to say much concerning the zoology of East New Guinea, for we never penetrated into the country for more than 4 or 5 miles; but every wild animal seen by us belonged to the ancient marsupial type, showing that the fauna there is of the same low scale of organisation as the Australian. We saw the dog everywhere, wolfish-looking, and savage and cowardly in disposition; and occasionally the cat, but not rats or mice. We met with various small marsupial animals—wallaby, and a small kind of bandicoote, and one specimen of the tree-wallaby. We saw some animals of the cuscus kind, in appearance like a tiny bear, not in a free state, but caged by the natives. At Collingwood Bay, the First-Lieutenant and I came on the recent droppings of some large grass-eating animal, which we were inclined to think was a rhinoceros. Flying foxes abounded everywhere except at East Cape. They seemed to love low swampy ground. We did not see any alligators at the far east of New Guinea; but they abounded at the entrance of the larger rivers to the westward. We met with several varieties of snakes, some like the carpet-snake and others we had seen in Australia. The death-adder was the only one decidedly recognised by us. The birds were numerous: we saw the cassowary, eagle, hawk, goat-sucker, pigeon, wild duck (of various kinds), rifle-bird, parrot, and lory. We did not see the bird-of-paradise; but the natives were largely adorned with its plumes. Some low coral islands, densely-wooded and uninhabited, we found to be inhabited by the bush-turkey or "mound-making megapode." This megapode cannot be compared in size to those we saw in Northern Australia, which were as large as a small turkey; whilst these are as small as a barn-door hen, of bright brown plumage, with strong yellow legs, and feet not unusually large, as the name megapode would imply. The mounds of these megapodes were about 5 or 6 feet in height, and 25 feet in circumference. The vast quantity of these mounds scattered about showed that these birds had lived and died, undisturbed, here for ages. We found them delicious eating after our salt-beef and pork.

There were many insects, and the butterflies were particularly gorgeous: some, the largest I have ever seen, were as large as a man's hand, and looked like birds when flying. We saw here a curious Australian insect, nick-named by us "Walking-stick." They were 6 inches long, with six slight legs, and coloured

exactly like the bark they fed on. At first we used to pick them up for bits of dead stick. Centipedes and the usual tropical insects were common; but the ant was our chief plague —one, light green in colour, rapid in motion, and about a third of an inch long, seemed to be of two kinds in habit, though not in appearance; for some tunnelled in the tree for a dwelling, and others gummed leaves together, and formed a pendent nest as much as 2 feet in circumference. A small black ant built large mud-nests in the trees here, and at East Cape we saw a black ant nearly an inch long. These ants bit fiercely, and made our task of cutting 600 tons of wood a very painful one. We did not see the large city-building-ant of Queensland.

The rivers contained a small red-speckled trout-like fish. The shore waters swarmed with edible fish, some of which had scales of the most exquisite and brilliant colouring. The crabs we found had small bodies and large claws, and are delicious. Mussels grow to a vast size: I have in my possession shells 22 inches long, and have seen larger. The valuable pearl-shell oyster is found in these waters.

VI.—*On the Inundations of the Yang-tse-Kiang.* By E. L. OXENHAM, F.R.G.S.

[*Read*, February 22nd, 1875.]

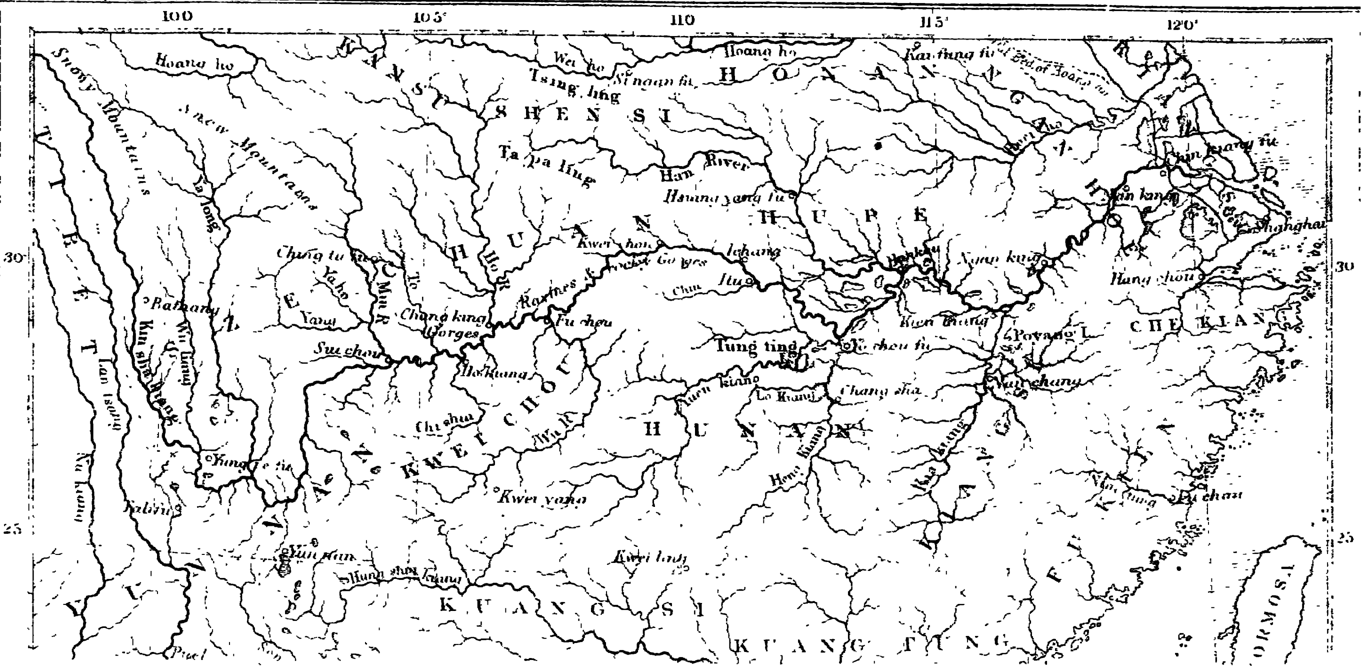
ALL the great rivers of the world are at certain seasons liable to sudden inundations, and in some cases, as in that of the Nile, they recur with periodical regularity. More generally, however, the floods, especially when dependent, not on a fixed certain event like the melting of snow, but on rains and storms, are of a more fluctuating character. The Mississippi in America, the Yellow River in China, and many of the rivers in India, may be quoted as instances of this.

The ravages of the Yellow River ("China's sorrow") have been known to us from our childhood; but that its great rival, the Yang-tse-Kiang, should also be subject to floods and inundations is not so generally known, and it is the design of this paper to attempt to describe and account for—as far as our present information about the country concerned will allow—the inundations which repeatedly overwhelm vast tracts of the country through which the Yang-tse flows.

The only claim the writer has to deal with this subject is that of having resided some three years at Han-kow, a large city of 700,000 inhabitants, situated in the province of Hu-pe, on the banks of the Yang-tse, at the place where the Han River enters

MAP OF THE BASIN OF THE YANG-TSE-KIANG,

Illustrative of a Paper by E. L. Oxenham, F.R.G.S.



it, some 600 miles from the sea, situated in the centre of the flooded districts.

He witnessed here three successive floods, and the observations he then made on this phenomenon have given rise to the present paper. Though it does not pretend to offer a complete solution of the question, it is hoped it may be of some assistance to others, who, with the fuller and more accurate knowledge of the unknown lands where the Yang-tse and its feeders rise, which fresh discoveries will furnish, will be able to complete the shortcomings of this essay.

It is necessary first to give some account of the river Yang-tse itself before proceeding to the subject of its floods. It is said, though the exact spot is not known, to take its rise in the southern slope of the Pe-Ling Mountains in Northern Thibet, whence, flowing in a south-easterly direction through Thibet, it passes through a country traversed in all directions by a vast snow-covered mountain system. It receives the drainage from these mountains, and this in the warm weather has a marked effect in increasing the local volume of the waters of the river. The mountains decrease in height as the river proceeds towards China, which, after a course of over 800 miles in the same south-easterly direction, it enters at the province of Yun-nan. The river now flows more to the east, and at Yung-pe-foo becomes the boundary between the provinces of Yun-nan and Sze-chuan, having received contributions from two large tributary rivers to the north, and several smaller ones from the south. The larger rivers in Yun-nan, however, flow southwards, the mountains of that province being in the north and near to the Yang-tse, so that, except in rainy weather and from mountain torrents, the water-supply from this province is not large.

After continuing to be the boundary-line between these two provinces for 250 miles, the Yang-tse finally—after having latterly flowed for 50 miles in a northerly direction—enters the province of Sze-chuan, and after 30 miles more of a northerly course turns again to the E.N.E. The mountains here, too, press closely on the river, and it derives most of its supplies from mountain torrents and small rivers, the volume of whose waters depends chiefly on local rains. The change of course towards the north carries the Yang-tse away from the mountains which have hitherto pressed closely on its southern or eastern bank, and the rivers which enter it from the province of Kwei-chow are of some size, ranging from 200 to 300 miles in length. From the north none enter till the city of Sou-chow, some 220 miles farther, is reached, where the Min River enters. This tributary rises in the north-west of Sze-chuan, passes the provincial capital of Ching-tu-fu, receives a great contribution

from the Yang River, which traverses 400 miles of another part of Sze-chuan, and enters the Yang-tse at Siu-chow, after an entire course of 800 miles. A farther 212 miles, still in a north-easterly direction, brings the river to Chung-king, and in this portion some gorges are traversed, whilst the T'o River, about 300 miles in length from the north, and the Chi-shui, some 350 miles from the south, enter the river. At Chung-king itself the Ho River, the second largest tributary of the Yang-tse, enters. The principal branch of this river rises in the province of Shen-si; flowing south into the province of Kan-su it receives another large tributary from the north-west, and entering Sze-chuan traverses three prefectures of that province, still absorbing in itself the contributions from several other important streams; it thus embraces the waters of half Sze-chuan and some part of Shen-si, and has itself a course of from 700 to 800 miles, whilst many of its tributaries fall little short of it in length or volume of water. After leaving this city, the Yang-tse, still in a north-easterly direction, enters the narrow, rocky gorges, by which it contrives to force its way through the mountainous region it has to traverse; for 350 miles the channel is contracted to an average of from 300 to 400 yards broad, and beyond the Wu River a stream of 800 miles in length, draining the north of the province of Kwei-chow, entering from the south, receives no tributaries whatever. In times of rain, however, innumerable torrents help to swell the volume of water, and their effect is considerable: at Kwei-chow the province of Hu-pe is reached; near this place two rivers, one from the north and one from the south, each about 150 miles long, enter. At I'chang the 350 miles of gorges and rapids end, and the river debouches on the plain of Hu-pe, and becomes about half a mile in breadth. A farther 240 miles brings the river to Yo-chow-fu, where what is called the Upper Yang-tse ends. In this portion a few tributaries enter the river, the chief being the Ching (or clear) River, from the south entering at the town of I-tu, after a course of 300 miles. At Yo-chow the Lower Yang-tse commences, and the great increase in the volume of water and breadth of the river is due to the influx from the Tung-Ting Lake, the largest in China, which absorbs into itself the drainage from the greater part of the province of Hunan. In another 123 miles Han-kow is reached, and here the Han River, the great tributary of the Yang-tse, enters after a course of between 800 and 900 miles. The plain or valley of the Yang-tse, for hills become visible from the river after Tung-Ting Lake is passed, continues for 100 miles, when another mountainous system is reached, that of Kiang-si, and here the channel of the Yang-tse is somewhat contracted by the moun-

tains, through which it has to find its way; 50 miles farther to the east Kieu-kiang is reached, and another 20 miles brings the river to the place where the Po-yang Lake enters. This lake absorbs the drainage of the northern portion of the province of Kiang-si, and is second only in size to the Tung-Ting Lake itself. To the east of this the river continues to broaden. The valley of the Yang-tse becomes of considerable width, between 40 and 50 miles, often bordered by mountains from 4000 to 6000 feet high; 400 miles brings the river to Chin-kiang, where it is a mile and a half broad, and a farther 50 miles to its mouth, where it exceeds 12 miles, entering the sea after a course of over 3000 miles.

It is not the design of this paper to describe or account for the floods which occur in the valley of the Yang-tse during its whole course. Such floods, and extensive ones, often cover large tracts of the country traversed by the Lower Yang-tse; but it is to the inundations which often submerge the portion of the province of Hu-pe traversed by the river that attention is now to be drawn—these being the most disastrous, and those which have come under my notice.

The province affected, that of Hu-pe, extends for about 410 miles from west to east, and 250 from north to south. It is the central province of China, and is bounded by the following provinces:—On the west by Szechuan, on the south by Hunan, on the east by Kiang-si and Ngan-hoe, and on the north by Ho-nan and Shen-si. It is noted for its fertility, the variety of its produce, its diversified and often beautiful scenery, its many mountains and lakes. The plains produce cotton and rice; the hills, tea, sugar, wax, and wood. The mountainous regions seem to cluster along its borders, and are continuations of more extensive systems beyond them, none exceeding 4000 to 5000 feet in height.

The central portion of the province is flat, traversed by a few low hills, offshoots often from some of the mountain ranges. This flatter portion is traversed often from west to east by the Yang-tse, and from north-west to the centre by the Han River, that important tributary which enters the Yang-tse at Han-kow. The plain is likewise remarkable for the number of lakes which it contains, all connected with the Yang-tse, or Han, and all deriving their supplies of water from the flood surplus of the summer risings of these rivers.

The mountain systems above mentioned require some detailed notice, as they have an important bearing on the problem of the origin of the floods. By far the most important of them is the one to the west of Sze-chuan, through which the course of the Yang-tse has been described as flowing, and which is but an

extension of the immense masses of snow-covered and lofty hills which cover Thibet, and amongst which the Yang-tse rises.

The mountains in the north are also an extension of higher ranges which exist in the south of Kan-su and Shen-si. They are below the snow-line, but attract a great amount of clouds. The Han River rises amongst these hills, and the volume of its waters is much affected by the rainy seasons there. To the south are the mountains of Hu-nan, of no great height, but extensively covered with forests. These hills extend into the south of Hu-pe to within 20 miles of the Yang-tse itself. The Tung-Ting Lake—which is also much affected by heavy rains—absorbs the drainage of this district. To the east and north-east are again mountains—an extension of the system to the east in the province of Kiang-si; through these the Yang-tse flows, and by contracting its channel they place an obstruction in the way of the downward flow of the current. Many lakes in connection with the river exist in these hills, but no large contributions of water are received from this district. Hu-pe, therefore, appears to consist of two portions. One, more or less of a plain dotted over with numerous lakes, ranges from 12 to 40 miles in length, and is traversed by two great rivers, with one or other of which all the lakes are in connection. The other portion, hilly and mountainous, surrounds the plain on four sides, and from three of these sides pours large supplies of water into those parts of the plain in which the basins of these two rivers lie. The plain in its shape much resembles a triangle, with its base in the west containing the basins of the Yang-tse and Han; and with its apex in the east, this narrower part being taken up by the valley of the Yang-tse alone.

The fluctuations of the river at different seasons of the year are so great, that though in winter the level of the river is much below that of the plain, it becomes in summer above a great portion of it, and in times of flood this proportion is increased. The very depressed parts of the plain are lakes; those somewhat higher are flooded every summer and covered with grass in winter only; whilst the still higher parts are flooded occasionally, and then but for a short time, and are therefore capable of cultivation.

Where a flood is mentioned, it is to this third class of land that the term is to be applied. It is in this plain that the floods about to be noticed took place during the years 1869, 1870, and 1872. It was during this time the writer resided at Han-kow, and it is of these floods he purposes making special mention.

Numerous instances are recorded in the local annals of Han-

kow* of extensive floods, or droughts, and the records go back to 922 B.C., when one occurred. In 130 B.C. was another, attended with great loss of life; whilst in 293 A.D. the Yang-tse is mentioned as being fordable in May. In 400 A.D. there were 30 feet of water on the plain. In 978, floods coming from Sze-chuan and the Han River destroyed the city wall, together with many cottages and fields, and there was a similar one—water 56 feet deep—on the plain in 983 A.D. In 1459 A.D. a great drought took place, and no rain fell from June to September: no food was to be got, and it is said men ate each other, whilst the cholera carried off great numbers. In 1464 great damage was again done to the crops, and men had to live on sedge grass and bark, and numbers died. In 1592, 1593, 1600, and in the last and present century, many floods are recorded, but the highest one on record in modern times is that of 1849, when heavy and continuous rains appear to have fallen at the same time over the whole of the vast area of the provinces of Hu-pe, Hu-nan, and Sze-chuan, resulting in a flood of astonishing severity and duration. At Han-kow it rained uninterruptedly in June for three weeks, and so cold was the weather that the people were compelled to wear furs and skins to keep themselves warm (the thermometer being ordinarily at that time of year from 80° to 90°). The water rose with startling rapidity, sometimes as much as 3 feet in a day, and the city was flooded to the depth of 12 feet, leaving little but roofs of houses above the water. Crops were everywhere destroyed, and innumerable houses swept away; whilst the long duration of the flood prevented the planting of the second crops, and famine and cholera were added to the miseries the people had to undergo, nor was it till December that the waters had completely subsided.

Passing over intermediate years, I now come to the flood of 1869. In that year, owing to heavy local rains and wet weather, in Hu-nan, the water rose early in June, and, by July 23rd, Han-kow was flooded to a depth of 3 ft. 8 in. Fine weather, however, ensued, and the waters had nearly subsided when fresh rains occurred; red freshets, denoting water from Sze-chuan, appeared in the river, and by the 5th of September the water had risen again to the height of 2 ft. Again fine weather ensued, and again the waters subsided; but large freshets from the Han, supplemented by smaller ones from Sze-chuan, and some local rains, again caused the water to rise, and by October 4th it had attained a depth of 2 ft. 6 in. Not till October 16th, and very slowly, did the waters subside.

In the June of 1870 the river was unusually low, the

* Han-kow means the "Mouth of the Han."

weather at Han-kow remarkably fine, and drought was even complained of in parts of the country in the vicinity. But in the beginning of July the water commenced to rise, continued to do so with great rapidity, at an average of 4 in. a day, and by August 4th, 4½ ft. of water covered the higher lands near the river, whilst on the plain there was nearly 50 ft. The plain became a vast sea, on which villages were to be distinguished by the tops of the houses, and roads by the tops of the willow trees. The population had to migrate to the hills near by: some chose the wall of the city (Han-kow), but this was itself submerged in parts; and 50 persons were drowned in one place by the falling in of the brickwork.

In Hu-nan drought was much complained of, but the country washed by the Tung-Ting Lake was flooded, and this, too, when the high-lands in the vicinity were parched for want of rain. This great rush of water was derived from Sze-chuan; the rains in June and July in that province had been heavier than had been known for twenty years. In the gorges of the Upper Yang-tse the waters rose as much as 20 ft. in one day; towns on the banks were, in some cases, half-destroyed, and the city of I'chang, situated at the commencement of these gorges and exposed to the first fury of the flood, lost half its wall, and had many of its houses swept away. So strong were the waters that they forced a way through a disused channel into the Tung-Ting Lake, and caused a rise in its waters, which was at first attributed to local rains in Hu-nan. In this year (1870), however, the waters having risen very rapidly, subsided as quickly: on the 22nd August the banks were dry, and the plain was relieved from water by the middle of September.

In 1871 there was no flood, but in 1872 the waters commenced rising very early. Local rains were heavy, and stormy weather and much wet occurred in the districts of Hu-nan.

In the beginning of June the waters came over the bank, and there was a flood of about 2 ft. Fine weather followed, however; the season in Sze-chuan was a remarkably dry one; the river there had been noticed by the eminent German traveller, Baron Richthofen, when he came down it in May, to be unusually low, and the flood, lacking additional support from that quarter, soon subsided, and by July the banks were again dry.

The description already given of the course of the Yang-tse, and of the province of Hu-pe, will have given my readers some idea of the origin of the supplies of water which feed the Yang-tse, and in summer cause it to overflow. I will, however, enumerate them in the order of their importance.

1st. There is the drainage from the whole of the mountainous

province of Sze-chuan, together with that of the northern parts of Kwei-chow and Yun-nan which enters the Yang-tse by rivers above the gorges, and by torrents in the gorges to the west of the town of I'chang.

2nd. There is the drainage from the forest-covered mountains of Hoo-nan, absorbed by the Tung-Ting Lake, and poured from thence into the Yang-tse, at Yo-chow, where the Lower Yang-tse begins.

3rd. There is the great tributary, the Han River, which, in its course of from 800 to 900 miles, drains the south part of Shen-si and the north-west of Hu-pe.

4th. There is the Po-yang Lake which receives the drainage from the Mountains of Kiang-si.

5th. There is the mountainous district in the east of Hu-pe, which supplies, indeed, but a small amount of water, but which, by the obstruction it gives to the downward current of the river when very full, has a marked effect in times of flood.

6th. There remains another source to which the floods of the Yang-tse have been often attributed, I mean the melting of the snow* in the high mountains of Central Asia and Thibet, where the river rises. I must be allowed to say, however, and hope to be able to prove, that this cause is wholly insufficient to account for the immense masses of water which are poured on the plains of Hu-pe in times of flood. It may be granted that the rise of some 10 or 12 ft. above the winter's level (which invariably occurs in the month of April) may be due to this source; the river is then confined to its own channel—some 30 ft. below its summer level—and a very slight increase in the supply of water would materially affect long reaches of the river. But the effect is soon exhausted; the additional water rapidly brings the river up to the level of the more depressed portions of the plain, with which it is connected by channels, and the surplus waters spread themselves out over these portions of the plain: the river ceases to rise in its own channel, and the effect of the snow-water is over. A source so distant, and one influencing the comparatively small streams which go to form the commencements of the Yang-tse, cannot be considered sufficient to supply the waters, which often cover the plains of Hu-pe 1000 miles off, though, that they influence the river very considerably before it enters China. I readily admit; and it may, perhaps, be allowed that the snow-waters have

* The Chinese themselves never attribute the floods to snow-water, but always to one of the first three causes I have mentioned They distinguish the source by the name—different in each case—they give to it. The colour of the water, too, is different: that from Sze-chuan is red; from Hu-nan, clear; from the Han River, muddy. The first risings are muddy.

some effect throughout the year on the Sze-chuan portion of the river,—but after May, a more potent cause of flood must be looked for, and this is to be found, and to be found only, in the summer rains which take place in the months of May, June, and July, which are specially frequent and heavy in parts of Sze-chuan and Hu-nan, and which, more or less, affect the whole of the immense district comprising 500,000 square miles, and consisting of the provinces of Sze-chuan and Hu-pe; the west parts of Hu-nan, Kwei-chow, and north of Yun-nan, and the south parts of the provinces of Shen-si and Ho-nan, the drainage from all of which provinces is concentrated ultimately in the Yang-tse.

With respect to the four floods mentioned above—those of 1849, 1869, 1870, and 1872,—the following points should be noticed.

In 1849, the local rains were very heavy; in July the waters rose rapidly and to a great height, and the flood was one of a prolonged duration.

In 1869, the flood lasted four and a half months; it commenced early, was subject to many fluctuations, never rose very high, and subsided slowly. There was much local rain.

In 1870, there was little local rain, the flood commenced late, rose rapidly, and to a great height, and subsided as rapidly.

In 1872, the weather locally was wet, the flood began early, rose to no great height, and disappeared rapidly.

The time for the melting of the snow may be calculated to a certainty, for a period almost to be limited by days; while the irregularity and uncertainty marking the arrival of the floods is one of their most prominent features.

In 1869, the flood began early in June; in 1870, in the beginning of July; in 1872, the first risings took place in May, and the flood had subsided entirely by July. The effects from the snow-water would, at any rate, be presumed to have ceased by September, when the cold weather would have returned on the higher mountains, but in 1869, the water actually commenced rising a third time at the end of the month of September, and continued to do so up to the 4th October.

The irregularity of their duration again points to an uncertain source. In 1849, the floods lasted from July to the beginning of December; in 1869, for four months and a half, in 1870 and 1872, for about six weeks.

The difference in their height points to an equally uncertain source.

Now, when there exist three great water-systems, all of which feed the Yang-tse, and all of which are liable to be

much swollen by summer rains: when, too, these rains vary in severity from year to year, and are most uncertain in quantity, we arrive at causes sufficient to satisfy all the requirements of the problem. The extent and depth of the flood depend entirely on which of the three districts its supplies are derived from. The amount of water supplied by either of these districts depends on the quantity of rain which happens to have fallen there. The duration of the flood depends on the number of the supplying sources.

The largest supplies of water are derived from the province of Sze-chuan; the whole water-system, rivers, torrents, &c., draining into the Yang-tse. This province, about 600 miles long by 300 broad, is very mountainous and attracts large quantities of clouds. The effect of continuous rain on the river flowing through it is most marked, often causing the river to rise as much as 20 ft. in one day. Many rivers and torrents, from Kwei-chow and Yun-nan, also drain into this portion of the Yang-tse, and contribute no small quota to its waters. The narrow channel in which the Yang-tse is here confined renders floods, proceeding from this district, peculiarly violent and devastating. Hundreds of torrents, created by storms of rain and the overflow from swollen rivers, pour a sudden supply into the narrow rocky channel of the river. One day's rain will make the river rise 2 or 3 ft., and continuous rain causes a daily rise of from 20 to 30 ft.: no water can be absorbed by lakes or plains at the sides, but all is compressed into one rocky channel. This immense volume of whirling, pent-up water is poured suddenly on the plain of Hu-pe, near the town of I'chang. The first fury of the flood has fairly expended itself by the time Han-kow is reached, 360 miles lower down; but floods from Sze-chuan (known also by the red colour of their water) are recognised by the rapidity of their increase, and by their too often very destructive results.

The flood of 1870 was mainly due to this cause, so likewise was part of the long flood of 1869, and the great one of 1849; indeed there are few floods which do not derive some portion of their waters from this great and abundant source of inundation. Every flood is not, however, derived hence, nor is it alone sufficient to create a very long inundation. Another great water-supplying district is the province of Hu-nan. The portion of it draining through the Tung-Ting Lake into the Yang-tse is about 200 miles long by 270 broad; very different in size and character from the great province of Sze-chuan and its adjoining districts.

The country from which come the rivers which supply the Tung-Ting Lake is the mountainous district in the south of the

province. Here the rivers take their rise, and as these mountains are covered with forests and attract large quantities of rain, floods here are common and often severe. The plains and lakes they have to traverse, before joining the Yang-tse, deprive them of all force and violence, and a flood from Hu-nan is characterised by the clear colour of its waters, by a slow and gradual rise, never attaining any great height. The flood of 1872, a slight one, was due entirely to this source; a portion of that of 1869 was the result of rain in Hu-nan, and the same province contributed its quota to the great flood of 1849.

The remaining supplying source is the Han River. This stream rises in the mountains of Shen-si, flows for the first part of its course, like the Yang-tse, through narrow rocky gorges, where its fluctuations from daily rains are very great. It then enters the province of Hu-pe, and about 40 miles north-west of Hsiang-yang-fu debouches into a plain, through which it flows for the rest of its course of 400 miles, to its junction with the Yang-tse, at Han-kow: its total length is considered to be from 700 to 800 miles. Floods from this river are never of great severity. The comparatively small size of the mountains in the district where it takes its rise, and the extent of plain it has to traverse before it reaches Han-kow, which absorbs much of its surplus waters, diminish its effects.

It is formidable chiefly as an addition to other floods, and in 1869 and 1870 contributed largely to increase the then already high state of the water. It does, however, much damage to the districts adjoining its banks along its course, and here, as in the plain traversed by the Yang-tse, numerous lakes receive its surplus waters, and many lands are annually covered with water coming down from melted snows of Shen-si mountains; of course it also contributed its share to the general calamity of 1849.

The Poyang Lake remains to be mentioned: this absorbs and discharges into the Yang-tse the drainage from the Kiang-si Province. Its chief connection with floods in the province of Hu-pe lies, not so much in its supplies of water as in the effect these supplies have in checking the downward flow of the current. In the event of a heavy influx from this lake, there is often a strong current upwards at this place, and in 1869 this was remarkably the case. The escape of water to the west of the Hu-pe Mountains is thereby checked, and the waters are kept up in Hu-pe longer than would otherwise be the case. A similar remark applies to the mountains in the east of Hu-pe. The contraction of the channel, caused by the passage of the river through these mountains, prevents the water from escaping in times of flood, while the lakes, in connection with the river, are

here too few to absorb, or to assist much in absorbing, the superabundant waters.

By help of the above remarks I trust the difficulties and anomalies which surround the floods of the Yang-tse may become susceptible of some explanation. Nothing in the rise of the river can be regarded as certain, beyond the first increase of the water from its winter level, due (as has been explained) to the melting of the snow when the area of water to be influenced by it is at its lowest, and when it is most susceptible of any slight additions. Farther than this all is uncertain. Floods may come up in May, June, July, or even in September, or may not come at all. Wet weather may be prevalent, and there will be no flood; fine weather may be predominant, and there will be a high flood, or there may be both rain and flood together. Floods may last one, two, three, or four months, and they vary as much in height as they do in every other respect.

It is not till the causes of the phenomena are investigated that this confusion can be reduced to any order, and the results would appear shortly to be these:

Floods may be divided into three classes. (1) Those from a single source. (2) Those from two or more sources successively. (3) Those from all three sources simultaneously.

In the 1st class, a quick-rising, violent flood of considerable height (as in 1870), and lasting but a short time, denotes, if the water be of a red colour, an influx from Sze-chuan. A slowly-rising moderate flood, of no great height, and also of short duration, comes, if the water be clear—as in 1872—from Hu-nan; if muddy, from the Han River. These floods vary in height, but are invariable in their duration, never lasting long. Such were the floods of 1870 and 1872.

In the 2nd class are floods from two or more sources successively. These last longer, as in the flood of 1869, when the water rose three separate times after having twice nearly subsided. These are, perhaps, the most injurious, delaying as they do the planting of the crops till October.

Of the 3rd class are those floods which are caused occasionally, but very rarely, by heavy rains descending simultaneously over the whole area of the country which supplies the Upper Yang-tse. In this case all the three supplying districts pour their waters at the same time on the plain of Hu-pe, and a flood resembling the dreadful one of 1849 is the result. The influence in retarding the escape of flood waters, of an overflow from the Poyang Lake, and the contraction of the channel of the river in the east of Hu-pe, has been already noticed; and inundations in the lower course of the river have a similar effect. These causes prolong, but do not actively augment the

floods, and though of importance in their bearing on the subject, have not come sufficiently under my notice to justify me in doing more than call attention to the influence they exert.

A plain, subjected to such regular and potent agencies as annual floods, may be expected to exhibit many points both remarkable and interesting. The forces of Nature have, for many centuries, been actively at work on the face of this plain. In ancient times, recorded in the classics of China, this part of the country is described as consisting of a great marsh, which the Emperor Yu, coeval with the Deluge, is said to have drained, and also to have guided into their proper channels "the River and the Han." Not even a Chinese Emperor could, however, altogether exclude water, and he left the plain dotted over with innumerable lakes.* Many of these have, in the course of centuries, been filled up, and their sites covered with villages and crops, their former condition being only traceable by the name of "lake," which many places still retain. The class of lands before-mentioned, which are subjected to inundation regularly every year, are generally still named lakes, and in many cases approached much more nearly to that condition some years back than they do now. Lakes are, however, still the prominent feature in this plain of Hu-pe; 40 or 50 varying from 12 to 40 miles long, and all in connection with the river, are situated on either bank from about 10 to 4 miles distance from the stream. Into these in summer, when the waters are high, the Yang-tse pours its surplus waters, heavily charged with earthy matter, brought down by the floods; and at the same time covers with similar water the lower lands near its banks. In the course of the summer, when the force of the current is diminished, this earthy matter gradually sinks, and is deposited in the beds of the lakes and on the surface of the inundated plains. At the sinking of the river the plain emerges, heightened sometimes by 2 or 3 inches of earth, while the lakes have become slightly shallower. The recurrence of this process, through a long series of years, would account for that disappearance of lakes which has undoubtedly taken place; and this agency is still at work, heightening the low lands, making the small lakes shallower, and generally increasing the plain. In some places the system of raising embankments to defend the low lands from the floods has been resorted to, and has resulted in making the bed of the river far above the level of the surrounding country.† The expense and trouble of keep-

* The two provinces of Hu-pe and Hu-nan were in former times one, known as Hu-kuang, "abounding in lakes"

† The same remark applies to the Han River, which, in many portions of its course, is above the level of the country.

ing these banks in repair is very great, and increases in magnitude every year; while some frightful calamity would appear to be inevitable should they ever give way. It is therefore far better to allow the forces of Nature to work their own cure unimpeded by artificial restraints.

This is the case through the greater part of the course of the Yang-tse. The very low lands, being raised annually by successive deposits, are given over to grass; on the higher lands are grown crops, which can be reaped before the floods—if they do come—arrive. Embankments are not rendered necessary, and the river-bed remains at its accustomed level. The Yang-tse, flowing through this alluvial plain, often changes its course by slow degrees. Masses of earth slip into the water from one bank, and are deposited on a bank on the other. In some places islands are formed in the middle of well-known channels; in others they disappear, and their place is taken by the water of the river. The main course remains nearly the same; but the changes would be greater were it not for the mountainous districts through which the river occasionally flows, where it is confined in permanent boundaries of rock and stone, very different to the yielding masses of earth and sand of which the plain is composed. It may be doubted whether engineering science could do much to ward off these floods. The Chinese have had a long experience of these phenomena, and are too shrewd a people not to have made use of every practicable expedient. No engineer can materially alter the slope of a continent, or prevent heavy rainy seasons, and the result of the experiment of embankments has been by no means satisfactory. Nature would appear in this case to be working her own cure; the land once a marsh has become dotted with lakes; of these lakes, many have been filled up or have disappeared. The unceasing industry of the Chinese people has covered with crops and towns large portions of this water-plagued land, and they still contrive to reclaim further portions by means of the assistance afforded them by Nature.

The amount of water annually supplied remains, however, as great as ever; and with the gradual diminution of the area of the lower plains, which now relieve the river, some other resource must take their place. The bed of the river has a general tendency to extend in breadth, and by this means it may possibly be able to accommodate larger amounts of water within its own banks, and so the plain may, in time, be delivered from those floods, from which, in some parts annually, in others more occasionally, it has so long suffered. But the process must be a long one, and at the present rate of change,

many centuries must elapse before this desirable result can be brought about.

VII.—*Examination of the Southern Half of Lake Tanganyika.* By LIEUT. V. L. CAMERON, R.N.; compiled chiefly from Lieut. Cameron's Diary, by C. R. MARKHAM, ESQ., C.B., F.R.S., Secretary R.G.S.

[*Read*, March 8th, 1875.]

THE geographical work performed by Lieutenant Cameron during his voyage round the southern half of Lake Tanganyika will form the principal part of the present paper. The explorer has transmitted his journals to this country in the form of diaries, entered day by day. This is quite right, and it is the form most valuable to our map compilers, and to those whose business it is to examine and scrutinize the work. It is not, of course, a form which is adapted for reading, and it has consequently been necessary to recast the portions of Cameron's notes, which are to be brought to your notice, into the shape of a consecutive narrative, at the same time using his own words as closely as possible. I have undertaken this task with some diffidence; but I hope to be able to bring before you the principal points, and to do justice to our absent countryman.

Lieutenant Cameron's discoveries did not commence with his survey of the lake. Even when travelling over trodden ground, from Bagamoyo to Unyanyembe, he took regular astronomical and hypsometrical observations, and has sent home careful route-maps and journals. After leaving Unyanyembe, he selected a route to the south of that of Captain Burton, and to the north of Mr. Stanley's route, which enabled him to explore a previously unknown tract, and to make discoveries connected with the drainage-system of the southern part of the basin of the River Malagarazi, the most important eastern tributary of Lake Tanganyika. He crossed the River Ngombe, which flows through a lovely, though perfectly flat country, with open glades of bright green grass, interspersed with numerous clumps of trees and shrubs. Water-lilies were abundant, and the views of the reaches, with green turf down to the water's edge, were enchanting. The clumps of fine trees were disposed as if planted by a landscape-gardener, most of them growing on little eminences, and some on the water's edge with their branches dipping in the stream. The Ngombe falls into the Malagarazi.

Westward of the Ngombe, in the country of Ugara, the dead

level continues for many miles, and then gradually rises towards a high range of hills. Here the River Mtambo, rising in the southern part of Utende, drains the eastern slopes, receiving many smaller streams and brawling torrents of beautifully clear water, and uniting with the Sindy close to its junction with the Malagarazi. The two rivers, Mtambo and Sindy, discovered and explored by Lieutenant Cameron, are thus, with the Ngombe, the principal southern feeders of the Malagarazi, and west of the Mtambo the country is more broken, but fertile and well wooded. This is the country of Uvenda. The marches were through a mountainous region with precipitous slopes of granite rock, and hills clothed with trees to their summits. Cameron ascended to the summit-ridge of this range, whence there was a splendid view stretching over rocky hills, expanses of emerald plain, and masses of sombre forest. The villages are built on the tops of precipices, or among rocks, as some defence against the slave-dealing Arabs. The travellers crossed the River Sindy on a natural grass-bridge, so firm as to appear solid ground, the river being a hundred yards wide, and the growth forming a natural bridge about half-a-mile long. The hill-country ends on the left bank of the Sindy, forming bluffs and capes that rise out of the plain. On reaching the Malagarazi at Ugaga, which he found to be 3048 feet above the sea, Cameron came upon the route traversed by Burton and Speke in 1858, which he followed to Lake Tanganyika. His latitudes, here, and again at Mpeta, a little further on, agree to a few seconds with those observed at the same places by Speke. This is very satisfactory, as establishing the correctness of both observers. Thus Lieutenant Cameron discovered and explored, in this first part of his journey, the principal southern feeders of the River Malagarazi, and an important range of mountains along the left bank of the River Sindy. His work completes the examination of this part of the Malagarazi basin, and is an important contribution to our knowledge of African geography.

Cameron got his first sight of Lake Tanganyika on the very same day in February that Burton discovered it, just sixteen years before. He reached Kawele (Ujiji) the next day, being the 22nd of February, 1874.

Before entering upon the details of the service that Lieutenant Cameron has done to geography, by the examination of the southern half of the lake, it will probably be acceptable if I recapitulate, very briefly, the extent to which this most interesting sheet of water had previously been examined by Burton and Speke in 1858, and by Livingstone and Stanley in 1871, and the conclusions respecting the hydrography of the Tanganyika which were arrived at by those explorers. The

exact scope and nature of the work which remained for Cameron to do will then be more clearly evident.

Captain Speke crossed from Ujiji to the island of Kasenge, near the western shore, in March; and Captains Burton and Speke explored the portion of the lake north of Ujiji, in two open canoes, in April and May. Burton also collected an extraordinary amount of information from the Arabs. As the result of his exploration and inquiries, he states his general views respecting the lake. He describes it as giving him the impression that it was a "volcano of depression" rather than a reservoir formed by the drainage of mountains. As regards the northern half, the walls of the Tanganyika basin rise in an almost continuous curtain to a height of 2000 or 3000 feet. Burton found the water of Tanganyika to be deliciously sweet; yet a careful investigation led him to the belief that the lake receives and absorbs the whole river-system of that portion of the Central African depression, whose watershed converges towards the great reservoir. Burton and Speke, owing to failure of provisions, were unable to reach the northern extremity, but they were informed that the Rusizi flowed into the lake at its northern, and the Marungu at its southern end. Burton had himself descended the incline for 240 miles, on the eastern side, until he came to the shores of the lake, and had seen that the Malagarazi and other rivers flowed into it. He therefore conjectured that Lake Tanganyika had no outlet, suggesting that it maintains its level by an exact balance of supply and evaporation. He accounted for the freshness of the water by the saline particles deposited in it being wanting in some constituent which renders the salt evident to the taste. This view was always supported by our late medallist, Dr. Beke.

Dr. Livingstone and Mr. Stanley, following in the track of Captains Burton and Speke, explored the northern half of the lake in November, 1871, and succeeded in reaching the mouth of the Rusizi, which was filled with large, reedy, sedgy islets. There was a current of two miles an hour flowing into the lake. The latitude was 3° 18′ 3″ s. On leaving Ujiji a second time, Livingstone and Stanley coasted along the east shore to the south, from December 27th, 1871, to January 2nd, 1872, as far as Urimba, where they landed.

Thus the northern half of the lake had been well explored from Urimba on the east side, and Kasenge Island on the west, to the northern extremity. But, when Cameron reached Ujiji, the southern half had never been explored, and was unknown except at a few points where it had been touched by Livingstone in his various journeys.

In 1868 Dr. Livingstone reached the southern extremity of the lake, which he describes as a deep basin, with sides perpendicular and covered with trees; the rocks a red argillaceous schist, down which flow several cascades. He was at the village of Pambete on the shore, and fixed the latitude at 8° 46′ 54″ s. This latitude is very important, as will presently be seen, because it furnishes independent evidence of the accuracy of Cameron's work. On February 14th, 1869, when very ill, Livingstone again reached Lake Tanganyika at a point on the west coast, under the escort of his Arab friend Muhammad Bugharib. The place was called Parra, at the confluence of the River Lofuku. He embarked on the 26th, but his illness was so severe that there was no attempt at an examination of the coast; and the voyage is described in half a page. Dr. Livingstone makes one remark of interest relating to the lake in this part of his Journal. He says:—"Tanganyika has many deep bays running in four or five miles; they are choked up with aquatic vegetation, through which canoes can scarcely be propelled. When the bay has a small rivulet at its head, the water in the bay is decidedly brackish, though the rivulet be fresh; but as soon as we get out of the shut-in bay or lagoon into the lake proper the water is quite sweet, and shows that a current flows through the middle of the lake lengthways."

During his stay at Ujiji, Dr. Livingstone attentively observed the phenomena of the lake. He found that the water was encroaching on the eastern side, and that there was a current from south to north. The Ujiji Arabs were of opinion that all the water, both in the south and north, flowed into the lake, but where it then goes they have no conception. The current flows north from February to November. Evaporation is at its strongest in the south part in November, and there is a southerly current from November to February. The flow and reflow are the effect of the rains and evaporation. The floods of the great rains in February again drive the water north. But for the current, Dr. Livingstone believes that the lake would be covered with *tika-tika* or aquatic vegetation. He crossed the lake again to Kasenge Island in July, 1869. On his last journey Dr. Livingstone skirted parts of the south-eastern shore of the lake. He first sighted it on October 8th, 1872; and saw it at a distance again on the 11th. On the 13th he travelled along the top of the range of hills lying parallel to the lake, and 1000 feet above it, and he continued to skirt the shores until the end of November. In latitude 7° 52′ s. he gives the width of the lake at 12 or 15 miles.

Dr. Livingstone, in July, 1869, seems to have held the opinion that Tanganyika has no outlet; for he says, were it not

for the current, the water would be salt. In November, 1871, he had not the slightest doubt that the lake discharged somewhere, and says, that the outlet of the lake is probably by the Rogumba River into the Lualaba. But the Rogumba, or Logumba, certainly falls *into* the lake.

Such was the state of knowledge when Lieut. Cameron reached Ujiji. Excepting that Dr. Livingstone had visited Pambete, on the southern coast, and had skirted along a portion of the south-eastern side, often at some distance, the southern half of the lake from Urimba on the east side, round the south end, to Kasenge Island, near the western shore, was unknown, and required to be explored. Moreover, if there was an outlet at all, it must be somewhere along this unexplored coast-line of nearly 600 miles, for the northern half of the lake had been twice examined. There was a geographical discovery of the first importance to be made which was involved in the careful examination of the southern half of the lake, and Lieutenant Cameron has now achieved this discovery.

His first duty was to establish a good point of departure, by fixing the position of Ujiji; and, in the instructions given to him by Sir Bartle Frere, he was also specially enjoined to ascertain accurately the height of Lake Tanganyika above the level of the sea.

Lieutenant Cameron found the latitude of Ujiji, by meridian altitudes, to be 4° 58′ 3″ S., and by dead reckoning 4° 55′ 30″ S. His longitude of Ujiji, by lunar observations, is 30° 4′ 30″ E., by dead reckoning 29° 59′ 30″ E. The point of departure for the dead reckoning was at a distance of 200 miles, checked only by meridian altitudes, so that the results establish confidence in all the intermediate work. His observations for ascertaining the height of Lake Tanganyika above the level of the sea are by far the most complete that have ever been made either on or near any of those inter-tropical African lakes. On February 27th Cameron observed, with seven of Casella's boiling-point thermometers, which gave the mean result as 207° 54′, and recorded the barometric height and temperature simultaneously. Next day he observed with two of the mercurial barometers invented by our Map-Curator, Captain George, which he filled on the spot. He also observed with four aneroids, the results of which cannot yet be computed; but there was almost an exact agreement between the thermometer and barometer observations. The height of the lake proved to be 2710 feet.

Cameron's result is more satisfactory than any that had previously been obtained, because it was got by several methods; and this was the first time that a mercurial barometer had ever been used here. But it corroborates the general

accuracy of Dr. Livingstone's former observation; and in this instance, as well as in his survey of the lake, Lieutenant Cameron has done a service to the memory of his great predecessor, in having established the correctness of his work by independent evidence; for Cameron was entirely unacquainted with Livingstone's results. This consequence of his labours will give the young Lieutenant, who suffered so much with the object of succouring Livingstone, even more pleasure that can be produced by the feeling that he has achieved a distinguished place as an African explorer.

Having thus carefully established a fixed point of departure, Cameron made preparations for his great work—the thorough examination of the southern half of Lake Tanganyika.

After much difficulty he secured two suitable canoes, and fitted one with mast and sail. He marked a lead line up to 65 fathoms, and contrived a waggon-roof awning for the stern sheets of the boat. The larger canoe received the name of the *Betsy;* the smaller one, serving as a tender, was christened the *Pickle.* Two guides were hired, who had a knowledge of the lake and of the names of the different points and bays, and the little expedition started in the afternoon of the 13th of March, 1874.

He shaped his course to the southward, along the east coast of the lake, and describes the portion between Ujiji and the Cape of Kabogo as very beautiful. The red cliffs and hanging woods reminded him of Mount Edgecombe. The gorges and ravines were full of trees, with red shingly beaches at intervals.

The canoe-men could not be induced to leave the shore, nor even to cross a bay from point to point, through fear of the waves; so that they coasted along round every indentation, and, while causing much delay, at the same time enabled a most complete and detailed survey to be made.

Dr. Livingstone and Mr. Stanley had coasted along this side of the lake as far as Urimba, where there is a great bay; and the completely new work of Cameron commenced at the Cape of Kungwe, which he rounded on the 23rd of March. It was off Kungwe that he was first informed that a river, called the Lukuga, on the opposite side, flowed out of the lake.

Owing to the two shores overlapping to the south, it appeared like the extremity of the lake. Torrents flowed down the sides of the hills, looking like silver threads dividing the dark-green slopes; and the opposite shore was much nearer, the width not being more than 15 miles. The lake is frequented by numerous birds, such as fish-hawks, kingfishers, divers, darters, cormorants, and gulls, besides swallows and martins.

Here, as in other places throughout the journal, there is incidental evidence of the sufferings and hardships which were gallantly faced and overcome by the solitary young explorer, in the performance of this arduous service. He was several times attacked by fever, was even delirious at one time, constantly in pain from boils and other ailments, and in great discomfort. At Kinyari he says:—"Very heavy rain in the night, and very miserable, as everything got wet. I got on a waterproof and surveyed the dismal ruins—bed, books, chart, guns, and all flooded. I put my head between my knees, after having gathered what I could under the cover of the waterproof, and sat like an old hen on a brood of chickens." These serious hardships and difficulties enhance the value of the work done, some portions of the results of which are displayed in the accompanying map. After the miserable night just described, Cameron quietly observes: "I suppose it is good for me to have these little bothers, as if everything went smooth there would be little to do." Next day the canoes rounded Cape Kalenzi, about the narrowest part of the lake.

The results of his observations up to this point impressed Cameron very strongly with the opinion that there must be an outlet to the lake. He had seen such an amount of water flowing into it, that it seemed to him impossible to dispose of all the surplus water by evaporation. Besides which, so many streams flow through salt soils that, if the water were disposed of by evaporation, the lake would be as salt as brine.

On the 28th the canoes passed through the strait between the island of Kaboga and the mainland, across the entrance of which a bar had formed. The island is well cultivated, and fan-palms are numerous, the fruit of which is eaten; but the people do not make toddy. On the opposite shore, at Ras Kafeesa, the village is approached by a long canal in the rushes, and is populous and extensive. The coast-line still trends to the eastward into a deep bay. This place seems to be a centre of some trade with the Arabs in ivory and slaves, and the people have cattle and plenty of provisions. The name of the village is Kargangwina.

On April 3rd Cameron encamped at the mouth of a river called the Musamwira, which he found to be the drain of the Likwa into the Tanganyika. His observations agree with those of Dr. Livingstone, that the lake is encroaching along the eastern shore. The spit and shoal at the mouth of the Musamwira occupy a spot where, a few years ago, there was a large village, and a group of islands further south was said to have been part of the mainland within living memory. The discovery of the Musamwira, and that it is the drain of the lake of

Likwa (called by Burton, Rukwa, or Ikwa) is noteworthy. Burton's information was that, after heavy rains, this lake was connected with Tanganyika; but the point had since been doubted, and the discovery of the connecting channel is an important link in the chain of evidence relating to Tanganyika hydrography.

On the 7th of April Cameron reached the Cape of M'pimbwe, the point where Dr. Livingstone first sighted this part of the lake during his last journey. This promontory is formed of enormous blocks of granite, overgrown with trees in the cracks and crevices.

A few days afterwards, on the 14th, the southern extremity of the lake came in sight. Here the islands are numerous off the shore, and the scenery increased in beauty. Cameron thus describes it: "On the outer side of Polungo Island the rocks are in enormous masses, scattered and piled in the most fantastic manner, the whole overgrown with trees jutting out from every crevice, whence hang green creepers, 50 or 60 feet long. Through the festooning fringe thus formed, glimpses are caught of dark hollows and caves. The scene appeared either as if designed for testing the capabilities of a stereoscope, or else for some grand transformation scene in a pantomime, and one almost expects the rocks to open, and sprites and fairies to come out. As one pauses to look at the wondrous sight, all is still, not a sign of life. Suddenly the long creepers begin to move, a flash of brown, another and another, and there is a troop of monkeys swinging themselves along. They stop and hang by one paw to chatter and gibber at the strange sight of a boat—a shout and they are gone. The glorious lake, with its heaving bosom, lies bathed in tropical sunshine, or darkened by some passing squall." On the 17th of April the southern extremity of the lake was reached. The shore was lined with high cliffs, having all the appearance of ruined ramparts.

Cameron, in several parts of his journal, furnishes interesting notes respecting the floating islands and aquatic vegetation. "*Tingy-tingy*" is the name for the grassy obstructions at the mouths of rivers, too thick for boats to pass but not strong enough for men to walk upon, and *Sindy* is the name when it will bear men. Thus the Kirumbwe River (Kalambo of Livingstone), at the south-east corner of the lake, is said to be all *tingy-tingy*, with a little *sindy*. The floating islands of Lake Tanganyika are formed of the long cane-grass called *matèle*. It grows very thick and gets other vegetation matted in at the water-line, forming a sort of floating peaty soil in which the young *matèle* takes root. The old grass in time dies and is set free, and when a favourable wind or current occurs, the island thus

formed starts on its cruise. It is somewhat in this way, also, that the grass-bridges are formed over rivers. The Musamwira, for a great part of its course, is covered with them.

On April 21st the explorer reached Akalunga, one of the largest villages he had seen in Africa, and, shaping his course to the northward, he commenced the examination of the western side of the lake. On the 23rd he passed the mouth of the River Runangwa, between very high rocky hills, covered with trees to their summits; and here a couple of *soko*, the ape also seen by Livingstone in the Manyuema country, were observed among the trees and rocks. They are described by Cameron as looking bigger than men, and are said to build a fresh house every day. The Runangwa River is the Marungu of Burton, which, according to his Arab information, flowed into the lake at its southern extremity. It, however, proved to be about 80 miles from the southern end, and on the western shore. At the same time the most southern ferry used by the Arabs appears to be at this point, and the Marungu was doubtless the furthest point to the south with which they were acquainted. Hence the information supplied to Captain Burton.

On the 20th the canoes sailed along a coast where there was much cultivation and small villages without stockades, showing that the country enjoyed more quiet than that on the eastern side. It came on to blow, and Cameron took in a reef in his sail by twisting the tack into a rope for a couple of feet and lashing it. A second reef was effected by a lashing round the after yard-arm. A good sea was running, with the wind aft; and Cameron calculated the waves to be sometimes 12 feet from trough to ridge.

After rounding Ras Tembwe the hills began to disappear, and the land became low, the points being inconspicuous, so that the bearings were of little use. On the 2nd of May a river called the Lukuga was approached, which the chief, named Luluki, described as flowing out of the lake, but as being much obstructed by grass. On this part of the coast the hills turn right back, both on the Kasenge side and on the south side of the Lukuga; and no high land is in sight in the distance.

At 11.40 A.M. on the 3rd of May, Cameron entered the Lukuga, and the chief came to visit him, stating that the navigation was difficult, that there was much "*tingy-tingy*" and "*sindy*," but that the river flowed from the lake into the Lualaba, and that his people travel for a month by it on their way to Nyangwe to trade. No Arab had ever been down it, which explains their ignorance on the subject.

On the 4th of May Cameron descended the River Lukuga

for 5 miles, and found it to be from 3 to 5 fathoms deep, and 500 to 600 yards wide. Here he was stopped by grass, but the chief, who accompanied him, said that a way for small canoes could be cut through it. The Lukuga is 1½ mile wide at the entrance. Grassy sandbanks, extending from the north side, leave only a clear entrance at the south end, where there is a bar, or more properly a *sill* of 9 feet, on which the surf beats pretty heavily at times. Over the sill the water immediately deepens to 4 or 5 fathoms. Five miles down the river, and close to the obstructing grass, the depth was 3 fathoms. The canoe was anchored inside the sill out of the wind, and she swung round quickly to a current flowing out of the lake. Bits of wood thrown into the water showed that the current was flowing out at a rate a little over a knot an hour. There had, however, been heavy breezes for some time up the lake from the south, and for part of the time the wind was blowing right up the Lukuga. But he did not believe that the wind could set the current back to such an extent; for he saw great pieces of drift-wood, 20 to 30 feet long, floating from the lake down the river until they disappeared in the obstructing grass. Another remarkable circumstance was that, whereas in all other rivers flowing into the lake the water was perfectly sweet, in the Lukuga the water had exactly the same taste as that of the lake, which Cameron describes as not salt, but peculiar. After leaving the Lukuga the breeze freshened, and they put into a convenient inlet a short distance to the north, which they found to be a part of the Lukuga. The coast consists of marsh and low flat plains, with some small openings with deep water in places, shoals, sandbanks, and long grass inside. Cameron formed the opinion that this low swampy bit of coast was formed of all the drift-matter of the lake gravitating towards its outlet, and then, there not being a fair passage for it, forming the bank and morass. This small inlet is merely a break in the bank, and the water works a way through the grass into the Lukuga.

Half-way to the Lualaba, the Lukuga was reported to receive another river called the Lurumbuji.

The River Logumba of Livingstone, which he mentions as the probable outlet, flows into the lake near the island of Kasenge, after a course nearly parallel to the shore.

On the 6th, Cameron arrived at Kasenge and the group of other islands first visited by Speke in 1858, and three times by Dr. Livingstone. They are only about 10 miles from the Lukuga River. Cameron made a survey of them; on the 7th he crossed the lake where the width was 24 miles, and arrived at Kawele (Ujiji) on the 9th, after an absence of 88 days. The

resulting chart is on a scale of 5 miles to the inch; constant bearings and cross-bearings, corrected for variation, were taken, and the work was plotted on the chart at the end of each day. The fixed point of departure was at Ujiji, and two other meridian altitudes serve to check the dead reckoning. But independent evidence is furnished of its accuracy by Dr. Livingstone's latitude of the southern end, and by his general map of the lake, of which Cameron was ignorant, but which agrees remarkably well with his chart.

The most interesting part of this survey is the discovery of the Lukuga outlet. Lieutenant Cameron himself is inclined to doubt the outflow being constant, and to think that, in the dry season, or when the lake is at its lowest level, little or no water leaves it. He, therefore, resolved to make a further and more extended examination of the Lukuga on his way to the Lualaba; and by this time his intention no doubt has been carried out, although we may not receive the result for a long time. Meanwhile the various facts already recorded respecting the width and depth of the Lukuga, its current, the nature of the bars and sandbanks, the taste of the water, &c., will supply material for speculation and for interesting discussion, especially if they are considered in relation to the size and shape of Lake Tanganyika, and to its general hydrography. The difference of latitude between the northern and southern extremities of the lake is 5° 29′, or 329 miles, and the whole length something greater, while the width varies from 10 to 25 miles. The level of the lake is said to vary from 8 to 10 feet between the end of the rainy and the end of the dry season, and the rivers become much diminished in size. The current flows from south to north during two-thirds of the year, from February to November, and to the south from November to February, when evaporation is at its strongest at the southern end. Thus the general flow of the current is due to causes connected with the course of the seasons and with the winds, and is not influenced by the position of the outlet.

With these facts before us, it will be interesting to consider the phenomena described by Cameron in connection with the Lukuga. That it is an outlet is beyond dispute, for the current was observed to be flowing out, huge pieces of wood were being drifted down, and the rate was actually measured in a position clear of the wind. The question is, therefore, whether the outflow is permanent or temporary; and the first point is its sluggish character. The current was only flowing out at a rate of about a mile an hour, but this is no reason for doubting the permanency of the outflow. One of our most distinguished medallists recently pointed out that rivers flowing from lakes

do not, as a rule, issue with strong currents, even though these rivers have, lower down, a very strong current with rapids or falls. The Niagara River, in the words of Sir Charles Lyell, "glides along at first with a clear, smooth, and tranquil current." The St. Lawrence, too, issues calmly from Lake Ontario. The River Kirkaig, on the west coast of Sutherlandshire, when "in spate," issues from Lake Kirkaig with a trivial current, though afterwards it has a fall of 30 or 40 feet, and is a torrent nearly all the way to the sea. Its neighbour, the Inver, is another example of the same thing.

The fact of the existence of an accumulation, analogous to a delta, and of a bar at the entrance to the Lukuga, is another point for discussion. Ordinary bars are, of course, formed by the water of rivers flowing into a lake or sea meeting the opposing force of the waves. But the accumulations at the entrance of an outlet from a lake might, perhaps, have a different origin. At the season when the streams flowing into the lake bring down most grass, and when the outlet causes a set towards itself from the greatest distance, then the outlet would draw in the largest quantity of floating matter. When the waters of the lake subside, much of this accumulation would remain in the bay round the outlet, and give rise to the formation of such a morass as is described by Cameron. The authority whom I have already quoted mentions that the Amazon valley channels often get thus choked up in the season of floods. The sill or bar would be caused by the existence of a band of hard clay or rock.

There is the further evidence of the Lukuga being a permanent outlet in the fact that, while there are steep cliffs and mountains round almost every other part of the lake, here the mountains sink down into a plain, on the north side very abruptly, and there is no high land visible in the distance in the direction of the Lukuga's apparent course. On the other hand, it may be that the outflow only takes place during a portion of the year. Instances are not infrequent of lakes which formerly had outlets, from which the water has ceased to flow, owing to the level having sunk in consequence of the lake receiving a much smaller quantity of water than formerly. There are also lakes whose outlets were once rivers, but are now mere swamps, such as Lake Balaton in Hungary. Tanganyika may possibly be another instance. All these are subjects for discussion.

But the question whether Lukuga is a permanent or an intermittent outlet can in no way affect the credit of its discovery. Lieutenant Cameron was himself doubtful on the subject, and is by no means committed to any theory. He has

made a careful survey of the previously unexamined portion of the lake, and found 96 rivers flowing in, besides torrents and springs, and one, the Lukuga, flowing out. And he sends home his results, which he has zealously and carefully collected.

Those results are by no means confined to the geographical discoveries which have now been briefly submitted to you. His ethnological materials are also valuable; and his journal is full of notes descriptive of the people he encountered, of their personal appearance, dress, ornaments and habits, arms, agricultural implements, methods of spinning cotton and making pottery, and of their huts and granaries.

He also made an extensive botanical collection, which unfortunately got wet on the way down to the coast. However, it has been submitted to Dr. Hooker, the President of the Royal Society, who finds that 101 specimens are fit for preservation, of which about a dozen are clearly new to science. These are all in a state which will admit of their being so described that they can be identified. About 35 were common African plants, and as such identifiable as they lay, and the names were catalogued. Dr. Hooker intends to send a notice of the collection to the Linnean Society for publication; and he has expressed surprise that Cameron could have done so much. "Had the collection escaped soaking," he adds, "it would have been a very fine one: as it is, it is very interesting, independently of the *flora* to which it belongs being otherwise utterly unknown."

Lieutenant Cameron has also sent home a small geological collection, which has been placed in the hands of Mr. Prestwich.

As regards our explorer's strictly geographical work, it may be summed up as follows:—

1st. He has discovered and explored two of the chief southern tributaries of the Malagarazi, and the chain of mountains on the right bank of the Sindy.

2nd. He has finally fixed the height of Lake Tanganyika above the sea, by observation of the mercurial barometer.

3rd. He has explored and made a careful compass survey, checked by meridian altitudes, of 560 miles of coast-line round the southern half of Lake Tanganyika.

4th. He has discovered the drain which connects the Likwa with the Tanganyika, and has fixed its position.

5th. He has discovered the outlet from Lake Tanganyika.

Lieutenant Cameron has thus done most valuable and distinguished service to geographical science, and the results are in your hands. In my opinion, he has proved himself to be an

able, a diligent and a careful explorer; undaunted by dangers, not to be deterred by illness or hardships, and admirably adapted, by his tact and kindliness, for the management of natives. I hope for your concurrence in this view. He has already rendered good service. He is now gallantly attempting to achieve one of the most hazardous and difficult exploits ever undertaken by an English traveller. That he may succeed, and that he may be restored to his country and his friends, must, I think, be the sincere and hearty wish of every geographer.

Lieutenant Cameron's Diary.

March 3rd, 1874.—Passing showers during day. Wrote to Dr. Kirk, Royal Geographical Society, and to Foreign Office. Sent map. Owing to the mode of weighing here, I have to submit to a frightful loss; the brass at the lowest price cost me over 20 dollars per frasilah; 10 dollars per frasilah at Zanzibar, and 8 dollars porters' pay, besides rations. So I have really paid over 320 dollars for the hire of the boat, instead of 250. The hiring was rather curiously arranged. The agent of the owner (Syde ibn Habil) wanted cloth, I could give none. Mohammed ibn Salih had cloth, but wanted ivory. Munya Heri had ivory, and wanted brass, which I had. So Mohammed ibn Salih gave the cloth to the canoe-man, Munya Heri gave Mohammed ibn Salih ivory for giving canoe-man cloth, and I gave Munya Heri brass for giving Mohammed ibn Salih ivory, for giving canoe-man cloth.

5th.—An awful bother about the canoe. Four days ago, the owner promised to put the caulking to rights; and yesterday I went three times about it, without avail. These people have no idea of the value of time. They talked of sending men to Unyanyembe, and they were to have started on the 28th, and only left late last night; mostly, I believe, because a caravan which may bring letters is expected in to-day or to-morrow. The sail spoken of by the Arabs as belonging to my boat, as a great inducement towards hiring her, has proved to be a myth, only the mast and yard being forthcoming, with a few tattered yards of satine. However, I have made another, which, of course, as I had taken trouble in the cutting to allow for drag, by giving a slight curve in the head, and had even pinned down the tabling to show where the sewing was to go, when I left the workpeople for few minutes, had been made hollow, if anything.

I had a party of minstrels here yesterday; they were three in number, and all armed with enormous rattles, which, when all three were going at once, drowned the voices. They would be a most effective weapon at a public meeting, in order to silence an obnoxious speaker. They gave a dance and a song. The first might well be the origin of the nigger break-downs and walk-rounds, and the yah-yahs in the second were precisely the yelps of the stage minstrel.

7th.—7 A.M.—Very heavy rains yesterday, with a little thunder and lightning, and one very heavy squall of wind from the north-east. No news, and nothing particular done, except that I got the men to work to caulk the canoe. I sent some cloth to buy corn for provisions (6 doti barsati). I hear a doti of barsati buys 50 or 60 measures, each holding 4 kubala. I hardly think it true.

8th.—Fever.

9th.—Fever. The fever commenced rather suddenly on the 7th, with a violent attack of coughing, and afterwards rheumatic pains. Am getting all right now. The rumoured measures of corn mentioned above scarcely hold 2 kubala.

10th.—All right again. The two men originally hired as lake pilots have thrown up their contracts, and they and the Mtiko who brought them have returned their cloth. So this morning have had all the bother of fresh engagements. The two guides received between them 15 dotis of various cloths, equal to 20 dotis common cloth, and 4 fundo of matunda, and 1 fundo ditto for food for 12 days, value in local currency about 5 dollars each (17 or 18) for their pay—rather high wages for naked negroes for six weeks' work. Besides, I had to give two Mtiko, between them, 2 doti joho (6 dollars), 20 lbs. of Katunda Nguru (14 dollars), and 2 smayli (6 dollars), 2 barsati (6 dollars) = 32 dollars; so altogether 12*l.* or 13*l.* had to be paid for the services of. two men. Talk of Africa being cheap; it is, as all uncivilized countries must be, the dearest of all places directly you want anything out of the regular run, and most things are out of the regular run. Marked a lead line (large fishing-line) up to 65 fathoms. I shall not be able to get more depth in the boat. Had a long yarn with an Arab trader about the road to Nyangwe. He gives the names of 45 stations, one of them being a village belonging to himself and other Arabs. He has volunteered to act as guide, &c., of course taking his own caravan.

11th.—First thing in the morning launched the boat (*The Betsy*), and went for a sail to test her capabilities. The sail, &c., answered better than I expected. After we returned I set to work with some bamboos, and made a waggon-roof awning. The awning itself I had made before, of heavy drill, the same as I had made the sail of, and lined with one of the blankets I found in Livingstone's stores, as the sun is what I have most dread of. If anything, it is more powerful, apparently to me, than anywhere I have been before. I could brave the sun with impunity in Annesley Bay, Bombay Dockyards, and at Aden, a few years ago; and here I feel it almost immediately.

12th.—Busy all day about the gear for boat; got a second lent me, a smaller one for tender, which I have named *The Pickle*.

13th.—Fearful bother trying to get anything done, as most of the men thought fit to be drunk the first thing in the morning; and it was some time before they got sober. An Arab's slave shot a donkey last night; got him flogged. Got away, after all, about 1 P.M. Kasenge, 230°; Bangwe, 304°; Ras Kabogo, 196° south; extreme west of lake, 224°; 4.10 P.M., just before halt. A light fair wind part of the way, of which we made the most in the *Betsy*. The *Pickle* can do very well under oars, pulling as many as we do; but it is much smaller, especially in the matter of beam and draught, and not of course carrying near so much cargo. Passed Jumah Merikani's village, and camped at Port Mfomdo. Slept in boat very comfortably.

14th.—Lovely country. Red cliffs and hanging woods, reminding one of Mount Edgecombe. The vivid greens and reds make up a lovely picture. Very soft sandstone and red loam, furrowed by the rain. Gorges and ravines full of trees. Red shingly beaches in places; otherwise cane-grass, except at foot of cliffs.

After two hours, halted at Ras Kifombi for breakfast. Had to caulk a hole in *Betsy's* stern, as she leaked badly, and was damaging cargo. This detained us somewhat, as we had to land cargo to get at it. Of course the stupid men wanted to put all the cargo in whilst she was high and dry, but I managed to persuade them to float her first.

Saw a small gull, body and head white; back tail and wings light grey, crossed with black and white at ends; red legs and bill. Long-necked

darters, divers, and grey and white kingfishers numerous. A chocolate-coloured fish-hawk, with white head and neck, about size of common fowl. Awning acts well with blanket curtains, and flags across front for door. I am quite private when I shut up. Got away at 1.10, and at 4 P.M. passed small river—Mafundwè. Passed Ugonga. Camped about 7.30. Very unwell all night.

15th.—6 A.M. Camped; very unwell all day and night.

16th.—Rather better, but halting to pick up a bit. Camp's name Cabongo.

17th.—7.40. Started. I ate a little breakfast, the first food for three days. I tried twice yesterday, but the first mouthful upset me. Passed camp in bay Karago. Passed Luvenga Camp and River at 9 o'clock. 9.50, Luguvu. 10.30, Camp Mulya Kima. N.B. Two small points and bays inside, between ourselves and Kiti. First regularly stratified rocks. Dip 22°. Strike north-west and north. Ras Kibwe Camp. Commenced chart, 5 miles to the inch. Some very curious sensations and ideas during fever. One night I thought I was about twenty people, and all in pain, and all felt for all the rest. Another night was much more distinct—a dual sensation. I was lying on starboard side, and thought some one, another self, was on port side. Some cold tea was on port side, and though *very* thirsty, I would not drink it, as it was not on my side. I rolled over after a time, and thought I changed places with my second self, and then I drank like a whale. The same thing occurred when I vomited. I was obliged to go to my own side of the boat, when Bombay or Mohammed came to see after me. I became sensible at once, only a little dazed.

18th.—A thunderstorm, with a little wind, during the night; and this morning all hands are afraid to start, because there is a little surf breaking outside, and a very slight swell, the remains of the storm. Got away, after all, at about 12.30. Coasted along for an hour, and camped at Machahèzi; a small river. Found three canoes of Wajiji going south to sell goats. No good trying to go further, as it was only after almost a mutiny that I got here.

19th.—Got away at 6.20. Wajiji in company. They believe in some sort of devil of Kabogo, but don't seem to know much about him. The two Wajiji guides threw three fundo of beads into the water to appease him. This is why they were afraid to come on before. The offering at Kabogo has been made in due form. The two Wajiji stood in the bows, holding the beads on the blade of the paddle, and said, "You big man, you king, you great man, you take all people, let us go all right;" and then the beads were put into the water, a little bowing and gesticulating being gone through. It is a double point, and the second is called the Devil's Wife. The strata here are much contorted, and the stone metamorphosed; and there are many faults and strata of same sort of stone lying unconformably. Small imitations of the Mississippi floating islands, in the form of islands of long cane-grass, carried down by the rivers and floated out to sea. I could not at first make out what they were when I first saw them. Fine bold hills steep to the water, almost precipitous. We increase the length of our journey by keeping in all round the little bays instead of going from point to point, but the men prefer it, as they think themselves safer, even if there be no landing. Saw a water-snake. Water deep close to hills. Rocky bottom. The endless monotonous howling of the men pulling is very distressing.

20th.—Got away at 6.30. A very heavy squall of wind during the night. I had to turn out and hold on to the roof to prevent it being blown away. Saw a waterspout. Nice cool day; no sun; a little breeze makes it pleasant, but not enough for sailing. Country all the same, low wooded hills right down into the water; landslips showing red patches, and here and there rocks and small cliffs. Hippopotami blowing and snorting during the night, making a fearful row.

21st.—Passed River Massuwah. Rocks in places seem of tufa. The bed of the Lake is gradually altering; all the numerous rivers bring down large quantities of mud, and the softer rocks, sandstone and loam, are being washed away. At Kawelè, since Burton's time, 500 or 600 yards have been washed for a couple of miles, and lots more will follow. Of course, all this must go to shallow the general bed of the Lake. Got a nice little breeze this morning, and are going on our way without pulling and its attendant howling. At 7.30 passed River Herembe, at 8.45 River Mikandosi. Camped in M'gombazzi, mapping. Saw some canoes of the natives hidden. River M'gombazzi, the first signs of inhabitants since Jumah Merikani's villages. Hippopotami snorting and blowing all round.

22nd.—This day, a year ago, we left Kikoka. I hope this year may be more prosperous. After camping, received a visit from chief of village near; the people are all Wanyamwezi (Wasukuma), and live by plunder; they had no food, but lots of ivory and slaves for sale. The price of a slave was fifteen small packages of grain, of which three or four could be got for a shukkah at Ujiji. There were two canoes of Abdallah ibn Habil's (a Wamruma) down collecting ivory and slaves, though the latter are going down in the market on account of the export being reported more difficult.

23rd.—9.45. Rounded Ras Kungwe. A river due west on other side Lukuga, said to go out of Lake. Numerous gulls; on a rock off the point were some cormorants, and divers and darters. I wish I had a steam-launch up here. The west shore trends right round to the southward. As we are going now it almost seems as if we had come to the end of the Lake. Strata, granite, mixed up with white sandstone. We passed two little torrents: one came down the whole face of the hill in a succession of waterfalls; it is a puzzle to me where the water comes from to supply it. A few patches of m'tama showed where some of the aborigines had settlements amongst the hills; the want of the country is population, and the slave-trade is depopulating it. Occasional beaches; either fine sand, or coarse shingle composed of granite, quartz and iron ore, broken into lumps like those for the foundation of a road. It is very pretty coming along; torrents coming down the hill-sides, and looking like silver threads and sheets. The Lake, besides, rounding to westward, is much narrower, not more than 10 or 15 miles across. Numerous birds,—fishhawks, kingfishers, divers, darters, cormorants, and gulls, besides swallows and martins. Hills higher than usual, almost rising to the dignity of mountains. Passed several floats over a fish-trap, called Kishoga. Camped in River Luuluga, near village Kinyari. The Wajiji, who have been coming down the coast with us, stop here to sell corn, goats, and oil for slaves, the only product of the place.

24th.—Served out food; beating corn. Went up to the village; saw a grand dance; there were two principal performers, who turned pirouettes, &c., like any ballet dancer; they also did some somersaults, but they were very tame, and lacked spring. One man had a mask of zebra-skin on, with holes for eyes, nose, and mouth, which looked remarkably hideous, as he walloped the big drum vigorously and howled. Saw a shield (rectangular), made of the wood of the fan-palm, 5 feet 6 inches and 10 inches wide, with a single handle of cane in the centre; it was 2½ inches thick, and would, no doubt, stop any spear or arrow. No getting away, as the men are all up at the village getting their corn beaten. Very heavy rain in night, and very miserable, as everything got wet. I got on a waterproof and surveyed the dismal ruins; bed, books, chart, guns, &c., all flooded. I put my head between my knees, after having gathered what I could under the cover of waterproof, and sat like an old hen on a brood of chickens.

25th.—Still horrid in the morning; and because there is a little surf outside, the people want to stop here, where all the rains collect on account of the

high hills close to, instead of going on to a drier spot. One lesson I have learnt, never to trust myself for a night without my tent up; my gipsy arrangement in the stern of the boat is all very well for fine weather, but wind and rain play the deuce with it. I have been nearly blown out of it before, and had a little wet, but last night was the worst. I didn't have much sleep, as may be imagined; my first rush was to see the boats properly secured, as the wind came down in a squall, and the stream was rushing over some stones in its bed a little higher up and making a row, and I had no taste for a cruise on the Lake with no crew but Bombay and his wife. Coming back, I found the boats nearly half-full of water, and had to rouse the men up to bale out. Before the rain I was kept awake by enormous and voracious mosquitoes, and was congratulating myself on their annoyance becoming less, when the rain came down, and soon drove me to work. I suppose it is good for one to have these little bothers, as if everything went smooth there would be nothing to do. One flash of lightning last night struck the water close to the boat. It was so vivid that I could not see for more than five minutes afterwards, although I heard the thunder pealing, and knew the lightning must have been flashing all the time. It was twenty or thirty minutes before I recovered my normal sight, and this morning my eyes feel curious, and are bloodshot. I thought at first for a moment that I was struck. The thunder and lightning seemed to come down all of a lump together. I can't describe it any other way. I am now longing for some sun to come out and dry things a bit, as it is very wretched having everything wet. Luckily I managed to get some dry flannels and some hot coffee at the end of the first part of the rain, before I got chilled at all, and after that I kept pretty dry, so I hope I shall feel no ill effects. The people have no fowls, and we are unable to get any eggs, fish, &c., from them; they only grow a few sweet potatoes and a very little Indian corn or m'tama, mostly living on imported food, which they buy with slaves obtained in forays on the Wavinza and Kowendi people. Some of the Wanyamwezi people from the last village are here on business. There were two or three platforms about the village higher than the stockade, and at each there was a pile of large stones for hurling at an assailant. These platforms were well defended by logs of trees, and all the stockade was logged up 5 feet or so, so as to be nearly musket-proof. I suppose all this was done on account of the unsettled state of the country. The price of a slave varies from 4 to 6 dotis, and even less if bought with corn and goats. Tattooing in circles and spirals.

We got away after all at 3 o'clock, having had some sun to dry things and to make us a little more comfortable. Passed Ras Kalenzi 1.40 from Luuluga. Passed numerous little torrents, over a dozen, between river and cape. The rocks, mostly granite, split, and laminated in the most fantastic manner. A sort of marble and sandstone overlying the granite in places. Numerous honeysuckles among the plants on shore. River and Ras Lubugwè. Camped 5.45. A few fugitives driven from their homes by the slave-trade up among the hills. Could not find a place for the bell-tent, so I pitched the other tent, which was rather a bother to do, as I found they had left the poles at Ujiji.

26th.—7.20. Passed small island, Kililo. 8.0. River Lufungu, Ras Katimba. Camped here, as wind and rain were coming on: go on again in afternoon if weather clears up. No wind to speak, and ditto rain; a little swell, which frightens my brave Jack tars. They say, "Lake bad, and canoes break again;" and persuade them to go on again I can't. The Wajiji, who have lived all their life close to to the Lake, are as bad as any; they bring up their hire, and say, "Let us go back. I don't want to die." Oh! for a whaler and crew for six weeks! I should be able to do something; as it is, we creep in and out of the bays, so that I can get no cross-bearings. All the danger

arises from this habit; they like to go along almost touching the rocks, and, of course, if there is any sea, or a sudden squall comes on, on shore they go; their extreme timidity actually brings them into danger: but I have always noticed this; cowards always in reality run many more and more dangerous risks, and come oftener to grief, than one who faces all things manfully. I believe nearly all fiascos and muddles arise from cowardice. Of course, there is such a thing as over-rashness and want of due precaution, but even this is safer than cowardice.

The Lake seems to turn right round to the south-eastward. I can see land to the south right across, so that the shape is different from anything on the maps. Well: if I get a fair map of the Lake, and a river going out of it, it ought to be worth something. I can't make out quite the Liemba of Livingstone yet. But they consider it a great compliment to compare one to Speke. Livingstone is looked on in a different category, as if he must be all right; and people have heard from Bagamoyo and Zanzibar of the different expeditions about him, and therefore think that he was a very great man. I have been asked if he was not very rich. About 50 days more ought to fix the Lake all round, which will bring me into May; and July ought to see me at Nyangwe; and I ought to meet Baker in September, and then it will depend upon what supplies are obtainable, and what news there is about the roads, how I shall go home; by the north of Victoria Nyanza, and Kenia and Kilimanjaro, or by the Nile. I shall principally go by Baker's advice. If by the Nile, I shall be home by the end of the year, and if by the Lake and mountains, in April or May next year. I wonder how all the outside world is getting on, and what has become of Grandy and his party. I expect he will find that he has to turn back for want of stores. He will find his work up the river harder than he anticipated. There is one thing I am pretty sure of; there must be an outlet to the Tanganyika somewhere, and I see no reason against the place named by the Wajiji guides. Such an amount of water comes into the Lake, and there are no signs of change of level, so that it seems impossible to dispose of all the surplus water by evaporation; besides which, so many streams run through salt soil that, if it were disposed of in that way, the Lake would be as salt as brine. Many of the streams must have been running in their present beds for thousands of years, as they have cut channels through the hills a thousand feet deep or more, right down through the solid rock. I believe that the elevation of the central plateau took place at a comparatively late period, geologically speaking, and that there have been no great changes since. I am in hopes, however, that when I get home I may manage to get sufficient people interested to organise a proper scientific expedition, under Government, if possible. I can't quite make out the description of the river said to leave the Tanganyika; the guides say it usually runs out, but when there is *much* rain in the mountains it runs in. I can only account for it by a reservoir being on the same level as the Lake, with an outlet on both sides. When much water drains in from the mountains, the water runs out of both into the Lake and to the westward; and when it falls below a certain level, the water from the Tanganyika runs into it and out to the westward. It would be a curious phenomenon of nature if it should be the case; but perhaps it may be merely the backwater of some large affluent in flood. Here has been a whole day wasted; the force of the wind was never 4, and would have been fair, but every one was afraid to venture, and I have been detained for nothing. They shall make up for it to-morrow, if I can manage it; but the guides want to stop at every place we pass where there has been a camp, and the men sulk if one doesn't stop, and won't give way. I somehow or another am very impatient, and always want to be driving ahead. I scarcely ever feel satisfied with a day's work; I am always thinking

I shall be blamed for not having done enough, but I try to get a little go into my crowd, but it is no use. Bombay certainly seems to feel an interest in the work, but what is one among so many? I suppose, if I am spared, when all is over, I shall look back on all these little bothers and wonder that they ever fretted me. Sambo, the cook, is a bother. I got enough ghee at Ujiji to last an army, and four or five days ago I saw above a gallon, and to-day he tells me there is none. The same with some honey that was given to me. I only had a little two or three times, and then I am told it is all gone. I can't go and see all the cooking done, and serve out the ghee, &c., and therefore I must go without. The same at Ujiji. I said, "Buy fowls to take with us." It was too much trouble; so they bought three goats, and of one I ate one kidney, of another the kidney and two plates of meat, ditto the third, and now I am two days without meat, and likely to be two or three more before I can get any. I don't growl about not having meat, but what I don't like is spending three shukkah on three goats, the greater part of which is wasted, when the same amount would have bought about three dozen fowls, which I should have eaten as they were killed without waste; but the goats could be got in the market, and to get the fowls he would have had to go from house to house, and had some little trouble. I have one great comfort, however, in a good milk-goat, which gives three cups of milk a day, which does for early morning, breakfast, and supper. The people whom I have seen as yet on the Lake are a remarkably clean, straight-limbed race. At Kawelè I saw one case of a paralysed side, and one or two cripples, caused, I think, by dislocation of the hip-joint; and at the last village a man (but he was a Mnyamwesi) who was almost a dwarf, he was only 4 feet 8 inches, or thereabouts. The people run about the average size of Englishmen. Lark-heels are not common; and the boys, before they fill out, have legs and arms long, lank, and without a particle of muscle. Protrusion of the navel does not seem so common here either as on the line from the coast. The country round the Lake as we have come along is very hilly, perhaps, from the precipitous forms, mountainous would be the better term; but the highest is not more than 1500 feet (at Kungwè) above the Lake, and the general run is from 800 to 1000 feet. All the country seems fertile, and I should think generally healthy, and ought to be a good place for a mission station. If we freed all the slaves we could easily form the nucleus of a settlement at Kawelè, the country round producing food in abundance, and with decent cultivation, a station might soon be made self-supporting; but whilst the slave-trade flourishes nothing can be done, and it will go on until proper means of communication are formed. A steam tramway would do more for Christianity and civilisation than can well be imagined. It is to be hoped it will come in good time; in the meanwhile exploring expeditions do some good, as the people see there is a higher race of people than themselves, who live for something more than trade, and to whom the idea of slavery is abhorrent. Rain in torrents at 9 P.M., but I have the big tent up, and am all right. I don't quite know how the men are getting on, but they had plenty of time to build their huts and make them watertight. I believe there is scarcely any real dry season here, but fits of rain for two or three days come on, and then it is fine for a week or so. No one should attempt to travel in a tropical country in tent without an inner fly, both on account of sun and rain; and the most important of all things to pack up is good temper, if it can be procured.

27th.—Got a very long shot at an eland on shore, but only broke his leg. It was no use going after him, as before we could have landed he and the rest were far away. Land running down low hills, from 50 to 200 feet high. Kiboko (hippopotamus) coming close to camp. Got up map. Writing journals till 12 P.M.

28*th*.—Got away at 6.40. Pulled out of bay. Shaped course at 6.50, 120° true. Pretty country. Low hills close to the water, and some higher ones about 4 or 5 miles back. 9.30. Going into strait between Kaboga Island and mainland; a bar across entrance to strait. Island well cultivated, huts dotted here and there, said to contain lots of game—buffalo, elephant, and all sorts. Fan-palms numerous; people eat the fruit but do not make toddy. Name, "Mihama." Whydah birds numerous, a reddish-brown wader, with white head and neck. Several of the fish-hawks have white tail and belly. Halted to talk with the natives—fine big men—and find out where the Sultan's village is, as there is said to be a big Sultan here. This is, no doubt, the "Insel Kavogo" of the Mombas mission. Strait widens out to half a mile or more after 1·5 mile. South-east end runs out into a sand-spit almost across channel. Ras Kwisa, 116° true. 11.20. Got to camp; total distance, 9·5 miles. A long way up a sort of canal in the reeds which, although it allowed the small canoes of the natives to pass easily, was too narrow for our big boats to pass quickly; we were half-an-hour pulling and hauling along by the grass. Sultan, Ponda: village, Kargan Gwina. Very large, and plenty of people. Divided on the inside into parts by fences of grass, each part enclosing several huts; and in the middle a large clear space, where there were a couple of logs, on forked uprights, for seats, and over them twenty or thirty skulls of men and two or three of leopards. One of Kasesa's men here trading. The people have cattle (short horns and humps, like Unyanyembe) and lots of food. Export ivory and slaves. Say they have milk, butter, pombe, &c., for sale. Very large spears, blade 20 in. by 3 in., half of Mtobwe wood, dark brown, and grooved irregularly all over so as to give a good grip. Clothing scanty, mostly skin, or bark fig-leaves; the swells, however, and women wear cloths obtained in trade. Many of the people indulge in a fresh suit of clothes every day or oftener; it consists of a bunch of grass in front and the same behind. They look exactly as if they had tails. Tailed people of the Ancients. Our men, although a ragged enough lot, look quite respectable amongst them. The Lake still going away to the eastward. My map is beginning to make a show.

29*th*.—Buying food, as much of our corn was spoilt by the rains, and had to be thrown away. The Arab here is not Kisesa's son, but lives with him when at Unyanyembe. He has been five months away and is tired of it, and wants me to take his stock of cloth and let him go. Ivory very cheap, ordinarily 12 or 13 doti satine for a frasilah; by hard bargaining he got 2 frasilah for 18 doti. He laments bitterly the high price of slaves—9 or 10 doti for a young man or woman, and 5 or 6 for a child. The chief sent and asked for a present, saying Arabs gave him 5 doti. I said: "That's all very well, they want to trade, and pay you for leave to live and trade here; I am travelling (not trading) to see the people. You know I have not been able to get food since Ujiji. The first thing you ought to do is to send me a present of food and drink, and welcome me." I gave 1 doti joho, a little salt, and he sent some sour milk, flour, and a fowl. They don't make butter here, having only four or five cows. A dance in the village. Two women were the performers, as were most of the spectators. They had bells round their ankles, and bunches of hair on their backs, and tied to their elbows and wrists. One principal feature of the dance was a sort of convulsive shaking, which was very disgusting; their pendant flabby bosoms shaking to and fro like drunken pendulums. They sang a sort of monotonous recitative, to which the other women occasionally joined in chorus. The drums as usual were beaten by men. The village is surrounded by a strong stockade and very deep ditch, the earth being heaped against the stockade. There are narrow paths up to the doors, and they are very jealous about allowing people in. The Arab here sent me a fine goat, giving milk; so now I have two for milk. The

day has turned out very hot and the sun very powerful, although there is a nice little breeze which ought to make it cool. Lots of staring. A bad case of leprosy seen: the other people allow the sufferer to mix up with them without any apparent fear of contagion, although he was losing fingers and toes. The chief here is afraid to come and see me, or let me go to see him, for fear I should steal away his mind and leave him an idiot. Some people came from Mkassiva, chief of Unyanyembe, with a present of cows to Ponda, who married his daughter. They were robbed of the cows by the Warori. I have their description of their route, but it is of no use.

30*th*.—Got out of the grass by 7.45, after a deal of trouble; 50 minutes of tugging and hauling and shoving. Lots of people down on the beach to see us pass, and others washing or filling water-pots. Fishing-baskets (very large) strewn about. The Arab here yesterday said he was afraid to stop here after I was gone, as there were so many Ruga Ruga about; so I offered him a passage in my boat; but he did not turn up this morning, and as we were passing the village he hailed us, and said his Wanyamwesi porters were more afraid of the Lake than of the Ruga Ruga, and that therefore he was going back to Unyanyembe. A low cliff of about 20 ft., behind the beach (which is sandy), overgrown with shrubs. A nice breeze, but foul; here is a lovely day, and yet they are afraid to go straight across to the Ras Makanyazi, but must keep skirting the shore. Many of the people had little circles of mother-of-pearl arranged as bandeaux across their foreheads. I tried to get a shell from which they are made, but all I could get out of them was that they came out of the Tanganyika. Low-level sand a mile or two back from Lake, evidently deposited. River Lunmbula. Got a light, fair wind, which is helping us on our way. Passed two or three small villages. Ras Makanyazi; low cliffs just before reaching. Granite and porphyry, sandstone and clay—very rotten. Caves and landslips. Occasional shingly beaches. Camp in Rugnou, 11.15, 11 miles. Abundance of monkeys on east side of river. Hippopotami and crocodiles plenty. Camped on right bank, low and flat, composed of sand brought down by river, as left side was too steep for comfort, and had no place for tent. Rather hard fare, as we are unlucky in the fishing line; dinner, bread and pumpkins. I prefer the milk I get from the goats to their meat, as I should only get two or three meals off one, and the milk is a great luxury. We should have gone farther to-day, but the guides report no camping-place for a long distance in front, and it is no use risking the boats for half a day, although much trust cannot be put in what they say; they always are the first to want to stop, although they have no work to do beyond telling the names of capes and rivers, and showing camping-places. They have usually been along the coast in small native canoes, which do not go so fast as our boats, and they cling even closer to the shore than we do, thereby making the distance greater, and they want to make the same stages now. One thing they must have, either a very retentive memory, or the inventive faculty largely developed, as they are scarcely ever at a loss for a name. I dare say, however, if some one else makes the same voyage he will find many names different from what I have obtained. But I must use such authority as I can get, and make the best of it. This is the 37th river since leaving Kawelè, besides several temporary torrents. I feel more and more certain every day that there must be an outlet somewhere, as such a body of water could scarcely be disposed of by evaporation.

31*st*.—A little wind in night, and now there is a slight surf, and the men won't start—at least I can't say altogether won't, as they profess they must go if I order them—but prophesy all sorts of dangers, and are just in the sort of humour when they would get into a mess on purpose to say: "There! came to grief just as I said."

April 1*st*.—The swell and surf yesterday were pretty heavy, and I dare say

with the clumsy Arab oars we should not have done much. Cape, no name; river, no name. Large torrent. 7.10. A patch with a lot of trees, with white flowers something like elder-flowers. 7.50. River Jiwé la Mbnabe. Very curious rocks, black streaked with white; limestone and red sandstone mixed, and a patch of what must be coal, from the appearance of the cleavage, passed at 8.5. If it is good it removes one of the great obstacles to the development of the country, want of fuel fit for steamers and locomotives; as, although wood will do, coal is much better. Almost directly afterwards we came to the usual granite, and then marbly and slatey rocks overlaid with red sandstone. No strike or dip could be estimated; the strike of the hills is usually parallel to the Lake, and the rocks are so torn by big torrents, rain, and landslips, that on the face of the cliffs they are much jumbled up together. It seems to me as if the vein of coal, &c., lay in a synclinal curve of the granite, and that its strike is at right angles to it. I should judge the thickness of the principal vein to be from 15 to 18 feet thick. All the men sing out, "Makaru Marikeku," or ship coal. Patches of dark marble and white limestone dip almost vertical. I could not get at it to get specimens as the rocks were steep, and one could not have clambered up, besides running the risk of smashing the canoe. I wish I had all the natural sciences at my fingers' ends, but I know very little about them, and must put up with my ignorance for the time. Some soft-looking greyish chalk shows in small patches here and there, and more sandstone and reddish soil, like the Weald-like lumps of stone-like Kentish rag. The strata of the cliffs seem to lie in great synclinal curves; have been worn away. 9.0. Low land stretching away to 150° true. The rocks run into cracks in each other in the most curious manner. Camped just before Ras Makanyazi. Plenty of honey here, which must not be taken on account of a devil who wants it all, and would wreck us if we took it. A small stream just before the big one. Saw a lot of monkeys on the way. Just as we got in I heard, "Mwamba! Mwamba!" and saw some of the men stealing about very cautiously, and sure enough there was a crocodile in the long grass; I could only see a little bit of his scales, and could not judge of his size, but he turned out small, about 3 feet in all. I fired two shots into him, and the first went in on the left side of the neck and came out behind the right eye; and the second cut off his head, at least the upper jaw before the eyes; whilst a Snider bullet Bombay fired only just penetrated his side, shows the different power of the guns. Not much of a camping-place, could hardly find room for my tent; and now everything is on a slope, and I have to prop up the legs of my bed with stones to prevent my tumbling out. I am promised chalk cliffs in a day or two. We are getting on down the Lake by slow degrees, over 70 miles E. and 100 S. from Kawelè. Burton and Speke's form of the Lake is entirely wrong.* I should almost prefer to leave it out altogether, only putting a note about it, than put it in on such vague surmises. No Arab at present at Ujiji has ever been down to the south end of the Lake, and in their land journeys have usually given it a pretty wide berth; one said it took a month to go right round, another two, another three, and the more honest—Syde Megrui and Mohammed ibn Salih—said they knew nothing about it. I was wrong about Kowendi not coming to the Lake, but it is a large district like Unyamwesi, which once contained many tribes, but now is almost depopulated by the slave-trade, as every man's hand is against every man, and no village really considers itself safe; besides which, there are raids and forays of Warori, Wanyamwezi, Wajiji, and Arabs, who sweep away thieved and thieves in one fell swoop. I believe that in many of

* I do not think Lieut. Cameron's map differs so much as to make this remark necessary, for on comparing Speke's, in 'Journal of Royal Geographical Society' for 1863, there is no great difference.—J. A. GRANT.

these affairs as many, if not more, are killed as are carried off. A few chiefs have allied themselves with the Arabs, &c., and thereby save their own people, but finding a ready market, become a greater scourge to their neighbours. Hippopotami blowing in the river, but the fires frighten them and they don't come near, although, to judge by their footprints, this is a favourite landing-place of theirs. How the unwieldly brutes scramble up the sides of the hills I can't make out. I should think their weight would prevent it, but they manage it somehow. The frogs at night sound nearly like a gang of caulkers or riveters at work, and a few louder or nearer resemble smiths, whilst a rarer one makes a noise just like a ratchet drill; so with a little imagination one may shut one's eyes, and think oneself in a busy dockyard.

April 2nd.—Limestone cliffs. Very extraordinary; it seems as if a sharp line divided the chalk from the granite and sandstone. 7.50. Site of Ponda's old village. 8.0. Camp Mgesi. Ponda left this neighbourhood, as his brother, Kwalunga, thrashed him in a row they had. 8.45. Camped, as a squall and thunderstorm were coming on. Made camp on a spit on which were a few huts; across its junction with the mainland was a heavy stockade, with crow's nest. A fire or two were burning when we landed, but the people had all gone to a village near, taking everything with them. The only big canoes they have seen down here have been manned and commanded by the slaves of Arabs, who are fifty times worse than their masters. I think the huts here could all have been built in about half a day, and the stockade must have taken a fortnight or three weeks. Squall from N.N.W., force 6 to 7, but soon passed over, and left a steady set-in rain; so it is of no use going on to get wet and uncomfortable. I find my Wajiji not nearly so ready with their names as they were nearer home. A village near, but nothing obtainable but sweet potatoes.

3rd.—Passed Ras Kifeesia. The Wajiji made an offering to the devil of the locality. "Oh! devil give us good lake, little wind, little rain; let canoes go well, go quick." 8.5. Passed river; no name. Cultivation and villages. 8.15. Passed Point Muri Katawi.

The shores in some places are being washed away, and in others the rivers bringing down mud are filling up bays; in some places dead trees showing out of the water 100 yards or more from shore show where the land used to be. The Wajiji say the Lake is getting bigger; if that be the case it must be getting shallower, as all the earth washed away from the shores and brought down by rivers must be spread over the bottom, or perhaps there may be a gradual subsiding going on; it is not the effects of flood, for the trees die from being in the water; and if it were annual floods that caused the difference of level, and they killed them, they could never have attained the size they have. This is well shown by fan-palms; those furthest out are only stumps; close in, trunks and no leaves, and then different degrees of withering in the fronds, till one comes to the healthy plant on shore. I rather incline to the idea of a gradual change of level, as if the shore were washed away the earth round the roots would be loosened, and the trees would not retain their upright position, but come down by the run. Stumps of trees seen as much as 600 yards from shore. 9.15. We are now passing over the place where a village has been. All the land low, the hills in some places being some way back, and low, and of roundish forms. 10.20. River Musamwira. A long spit, with patches of grass, and forming a sort of marshy island at the end, shoal water extending far out; all land a few years ago. 11.45 to 12.10. Rounding sandy point and crossing shoal, and getting into camp. A small village near. People in the village wanting to run, thinking that we were Mirambo's people. Perhaps they supposed he had annexed Ujiji, and seized the Arab fleet as an indemnity for war expenses. I find the Musamwira is the drain

of the Likwa into the Tanganyika. Where the spit and shoal now are was once a large village about two years ago; so Stanley was wrong in putting down the Ruangwa (which is in Burton) as an alternative name for the Marungu; I expect Stanley heard that the Likwa came into the Lake, and also heard of the Ruangwa, so he mixed the two up together. We have restored confidence, and I have got half-a-dozen eggs, a great haul; as although I am quite well, a purely vegetable diet does not satisfy, and great part of the beans, which are the best food, pass through one quite unchanged. The guides give thirteen stations more to the bottom of the Lake; but it is very difficult to judge anything from their number of stations, as some days we pass two or three, and on others it is a long stretch between two, but as an average we ought to do it in nine or ten days, which would give us another 120 miles or thereabouts, if there are not any great bends. It will take to the beginning of June if I do the whole Lake, unless the west side is much straighter than this one, but it would be a pity to leave it half finished. What astonishes me in Burton is that he talks of the south end being only twelve stations from Ujiji. He got wrong in thinking Marungu to be the south end, whilst it is on the west coast; and the north end might possibly be reached in twelve or fourteen days from Ujiji, but it would be hard work; but every bit of information he got was from Arabs, and all their statements must be received *cum grano salis*. The people who lived in the village that has been washed away have built another some little way off on a hill, so as to keep clear of the water in future. I have seen no shells as yet, but hope to find some soon.

4th.—Got away at 6.30. Strong current setting W.N.W. The country through which the Musamwira flows from the Likwa is called Uungu. 7.0. Passed Ras Mubaum. Another devil; the officiating Mjiji made the usual oration, and gave a Khete Khanyero and a pinch or two of salt, and put a little salt on his own head. This devil's name is Musamwira. I asked why he didn't live in the river of that name, and they said: "Oh! he goes there, but he lives here behind the hill." Into camp, no village, only camping-place. Trying to fix the countries of the Lake as far as we have come. South limit of Ujiji the Ruche River; Ruche River to Malagarazi Ukaranga; from Malagarazi to here Kowendi; here to south end on east Ufipa, and then Ulungu; on south part of west side Marungu; then U'Thembwe, Uguhha, Ugoma, Uvira. Uzige (north), Uvundi, and Ujiji again. There used to be an Utongwè from Ras Kungwè to here, but when Ponda's father Kampana, who was chief of all Kowendi, died, all Kowendi split up into little parts, and Ponda and his brother Kwahurga came with a lot of them, "drove the Watongwè away, and settled at Katawi. Ponda and his brother then quarrelled, and Ponda being thrashed, left his brother's neighbourhood and settled at Karyan Gwina, still in part of Old Utongwè. The Watongwè (or most of them) who escaped have settled in Ufipa, and are now living mixed up with the Wafipa." M'Pimbwè is the name of a cape in Ufipa, not of a country, as Stanley makes it. It also, no doubt, is the origin of Burton's mistake in placing part of the Wa 'Tembwe on the east side of the lake.

5th.—7.15. South end shut in. Squally from northern, with a few passing showers. Got the sail up for a little bit, but all hands got in such a funk that we had to lower it again. Bombay was the only one who did not seem afraid. His wife, who is rather given to jaw, slanging him like fits, and singing out "Tua tanga" (lower the sail), and he laughing at her. We came along pretty well whilst we had the sail up, but the awning made her gripe terribly. The trees here are putting out their new leaves, various shades of red, yellow, and brown, making them look like autumn in England. 8.25. Going south. Water here again where village used to be. Shoals and sandy islands. 9.20. Camped on small sandy island, where a few fishermen's huts

were. They were all built on stakes, the floors being about 4 feet from the ground. Rather a panic on our first arrival, but confidence soon restored and we got some fish and sweet potatoes. Soon after we camped it came on very heavy rain with thunder and lightning, and then set in for a steady soak. About 4.0 the swell came up, and the surf came on and threatened more; and as the water was washing up into my tent, we made a shift on to the mainland. Weather looking as if it would clear up for to-morrow. All the dawdling lazy fellows I have ever come across were excelled in that line by our men to-day. I said to Bombay last night, "You want food, so we will make a short day to-morrow and get it:" so to-day instead of giving way, and getting into camp as soon as possible, they went chopping water like dockyard mateys paid by the hour, and kept on stopping, and also instead of going straight across with a fair wind, they would keep hugging the land, and besides going over three times the ground, made a foul wind for part of the way. I cannot get them to pull from point to point, although they allow that the boat would float just as well there as close in; they stop pulling if they think we are too far out, and short of extreme measures one could not make them give way. With all this, it is impossible to be really angry with them, as according to their lights they do very well. They always look for pitching my tent quickly; and at any muddy or bad places on the road in ordinary travelling, or bad landing here, I always have a lot of volunteers to carry me across; and, in fact, they look after me very well. I like most of them very much, but still do not put the slightest trust in their pluck; the great thing to trust to is that all people hereabouts are cowards, and that in any row it may be hoped that the other side will be even more coward than ours. Saw a perfect specimen of a tailed man to-day; his dress consisted of a piece of string and a kitten-skin in front, and behind he had a large bunch of the hair of zebras' or buffaloes' tails, tied on so as to look exactly as if it grew in the proper place for a tail. Picked up some small shells to-day at the fishing village (bivalves), but all were much waterworn. Noticed how the floating islands are made (in fact saw some on the point of starting). The long cane-grass (Matètè), which grows very thick, gets other vegetation matted in it at the water-line, which forms a sort of floating peaty soil, in which the young Matètè takes root, and the old grass in time dies and sets this free, and when a favourable wind or current occurs it starts on its cruise. It is in this way that the grass-bridges over rivers form. The Musamwira for a great portion of its course is covered with them, but not so firm as the Sindy one.

6th.—Obliged to stop for a little, as the men could get no food yesterday on account of the rain, but hope to get off about the middle of the day, if it proves fine. Had to stop all day, as the men swore they were unable to find food in the morning. All humbug and laziness.

7th.—Got away at 6.45. A most curious optical delusion. The mountains on the west side seemed as if their summits were covered with snow. I was wondering at this, and looking steadily at them through the glasses, when the white suddenly began to disappear, and then I saw what it was. The tops had caught the horizontal (or almost horizontal) rays, which were reflected on them by the lower side of the clouds, and against the dark lower parts looked quite white. Very curious. May not many reported snow-mountains be ascribed to this cause? Ras Koweku, what the guides have been pointing out to me as Ufynombè. The wasting process is going on here, and trees and rocks show where it (the land) once extended to. Ufynombè is a village in bottom of bay between Kiwè and Mpimbwè. I have altered my opinion about a subsidence of the bed; the land is washed away by the surf, and I suppose the trees sink gradually deeper into the earth as the surface is washed away. Ras Kamatete close to Kiwè. The amount of ground that has been and still is being removed is very large. 9.15. Village Mpimbwè

at bottom of bay. Mpimbwè promontory formed of enormous blocks of granite (scattered about anyhow, as if the Titans had been making a breakwater) and sandstone conglomerate, &c., in the cracks and crevices, and all overgrown with trees. Halted for half-an-hour, went on at 10.45. Heard some firing, and a cry of "Nyama!" so I got my rifle and was going out, but found that they had killed a pig, and there was nothing more; in putting my rifle back against the tent-pole the hammers somehow fouled the hammers and trigger of one barrel of the fowling-piece, and fired it off. I had my head against the tent-pole and the muzzle was almost touching the tent-pole. I felt quite stunned by the report, and started backwards. I fell over my bed, not feeling quite sure whether I was shot or not; the first thing that told me I was not was hearing my servant, who was in the tent, singing out, "Bana amepiga" (the master is shot). I picked myself up and assured the people of my safety. It was a very narrow shave.

8th.—Got away at 6.20. Fine day, perfectly smooth water. Pulled round the point. Small island off point, reef between it and main. The soil a very soft light red sandstone, in fact hardly stone at all, and the large masses of granite and harder sandstone imbedded; the water washes away the sandstone, and leaves the harder rocks either in piles or half-sunken reefs. Passed Ras Kambemba and island close to. I believe that exactly the same process is going on here that in earlier ages formed the hills and mountains we came across between Liowa's and Ugaga, and deposited the rocks in Ugaga about Usekke and elsewhere, and also formed the rocky hills of Unyanyembe. The whole country was at one time an enormous lake, with a soft sandstone bottom overlying granite; and as it contracted either through a general elevation of the bottom, or from any other cause, the surf on the shores cut away the sandstone and left the harder rocks standing out in their present forms. Of this sea, most probably a fresh-water one, Tanganyika, the Nyanzas, and the Livingstone Lakes are probably the remains. It may have been salt, witness salt soil of Uvinza and Ugaga, and freshened by the continued rainfall of thousands of years. The whole country, except for a gradual elevation of the whole mass, must most probably have been left unvisited by any great geological convulsion since the days when subterranean fires formed the granite, which constitutes the great mass of the whole.

Another devil, Kamasanga of that ilk; the people performed the usual devotions. A large floating island a quarter of a mile in diameter.

7.55. Low limestone cliffs, stained pinkish in parts by the sandstone washing down over their face. Signs of recent cultivation at our last night's camp, and marks where a few huts had been. I ask where the people are; "killed, slaves, or runaways," is always the answer. In addition to a railroad, the country wants governing by some one strong enough to prevent all these wretched feuds and forays. 9.10. Ras Katanki close by. Small rocky points inside Katanki. Nearly half-an-hour wasted by men in nagging about camping-place. 10.35. Massanga, small village. 10.30. East and west of Lake close in. I am not quite sure that the points may not be islands, but I think not. I expect this is the narrowing of Livingstone's Lake Liemba. 10.45. R. Mellamasanga. A short halt of ten minutes, and camped before Chakuōla. A cowardly panic amongst all hands because I made sail to the breeze before a thunderstorm, in order to get in before the rain came on. Got in all right, and tents up before rain. Two canoes of natives here in a horrid fright; some men stopped and prepared for action (the owners of the canoes), and some more bolted off into the jungle. We soon restored confidence, and bought some fish. Gave Bombay a lecture about the way he gives in to the men and allows them to nag at him. I hope it will have the desired effect. The Wajiji guides came and asked for a present, saying it was customary to give them some cloth to dress in; they have only been wearing bark cloth, and I suppose did it to

excite my commiseration. I gave them a cloth each, but it is a great do, as they are enormously paid already; but they are very good and very useful, so I do it with a good grace.

9th.—Actually shoved off at 6.15, and Bombay roused the men before I sung out, which I usually have to do; only half-an-hour packing up instead of an hour. 6.35. Ras Chakuōla. Village in bay behind Chakuōla, Karunda. Rocks after leaving camp, a sort of pudding-stone, looking as if it had come out liquid clay and picked up a lot of small stones; River Chakuōla near village Karunda in bay. Both islands are called Makakomo. Kapoopia, name of Sultan of Makakomo Islands, said to be a big chief. People on islands wanting us to stop, but it is too early to camp. 10.15. Passing between Mavuni. The guides say all these islands were part of the mainland within their remembrance. Halt for 25 minutes. 12.10. Passing Ras Makurungwe. The rocks very fine and grand, and great masses of granite 70 or 80 feet high, with perpendicular sides. 12.40. Island Kowenga, huge lumps strewn about in the utmost confusion. Camp at Kitota. Got a fowl for breakfast, if that can be called breakfast which one has at two in the afternoon. Not a bit of imported cloth to be seen in the village, the people wearing skins, bark cloth, or cotton of their own manufacture. When we landed only the men were in the place, the women and children were run into the jungle; the men had cleared for action, each had his bow and half-a-dozen arrows ready, and about twenty more arrows in a quiver.

10th.—Squalls and rain during the night, and now looking rather wild, so we are waiting to see how it turns out. On beginning to pack up about 7.0, one of the Askari (Mungreza) in getting into the boat somehow shot himself; the bullet went in under the right arm and passed either close in front of or behind the shoulder-blade, coming out at the lower inner angle; but he is so fat one cannot say which course it took: the lung is not injured, and there is no escape of air, so I am in hopes that he may be all right. I made a couple of pads out of a cambric handkerchief, and bound him up, lashing his arm so that he cannot move it, and hope he may be all right; he bled a good deal at first, but it was all venous blood, so no artery is injured, and it soon stopped. It comes from disobedience to orders. I am always telling them that if they keep their guns loaded they will be shooting themselves; and punished many men, until Murphy and Dillon got me to give it up, saying, that if the order were kept up it would always be disobeyed, so I reluctantly gave in, and this is the consequence. Had to stop on account of the wounded man. Got rather unwell myself; in the afternoon quinine.

11th.—The wounded man going on all right. The wound is behind the scapula, and only flesh and fat hurt. The fool was getting down the bank, and used his loaded rifle as a boat-hook, holding it by the muzzle, and clawing at the gunwale of the boat with the hammer. Got away at 6.15. Pulled round next point (of day before yesterday). People keep up their clothes with grummets (?) round the waist, as thick as the little finger, sewed over neatly with brass wire. Some wear two or three. Some of the people anoint their heads with oil in which red earth has been mixed. It makes them look as if they had dipped their heads in a pool of blood. Fancy yesterday, after I had lashed the man up and given him some morphia to make him sleep, a lot of his chums gave him hot water to drink, in order, as they said, to get out any bad blood that might have got into his stomach; he retched most violently, and of course the bleeding burst out again.

Village on Kowenga Island; rocks very fine all along, but I am too ill to sketch; it is as much as I can do to get the bearings and keep them in their proper place. 8.45. Passing rocky island. Went into Makukira (river and village) and camped, as I was too ill to take bearings any longer; pain in eyes and forehead. Big village, large ditch, and stockade banked up on the outside.

Chief wore a tiara of leopard-claws, roots dyed red, and behind it a tuft of coarse whitish hair; wore a pair of leopard-skin aprons, a few circles of yellow grass below his knees, and a ring of sofi on each ankle. His fly-flapper with the handle covered with beads. He was profusely greased, and had a patch of lampblack on his chest and forehead. His tattooing was very simple on his chest, but into all the marks lampblack had been rubbed. His wives (one very good-looking) were busy getting the pombe ready for him: a calabash full was brought out and some of it poured into another, and then filled up with hot water; one of the wives then sat on a stool alongside of him, and taking the calabash on her lap, held it for him to suck the contents through a reed. He sent me some down to my tent, but I was too ill to drink it, besides its being too thick. The girls who have no children make a doll of a calabash, often ornamented with beads, and lash it on the back, where children in their countries are usually carried. Children reared at breast to two or three years; and I saw one alternately sucking at nature's fount and a pombe reed, so that they may actually be said to imbibe the taste for pombe with their mother's milk. Long knobbed walking-sticks used by chief and his wives. Beads and wire pretty common: spears moderate.

12*th*.—I hear now that Dr. Livingstone struck the Lake over Makukira village on his last journey. Lake only about 10 or 12 miles wide here. Going east into village and river to camp; rain coming on. I find out about the Doctor and the Lake; he did not come down to it. Village, Kirumbu; chief, Missasso; river, Mivito. A good deal of cotton is manufactured hereabouts, nearly a third of the population wearing clothes of native make. It is coarse stuff, something like a superior gunney bag. The patterns are of check, something like a large shepherd's plaid; black stripes near the border and plain whole, all of course with a fringe.

13*th*.—6.0 A.M. Not a single wink of sleep during the night, why I don't know, partially the pain of new boils on my leg which I am trying to drive back with caustic. N.B. Lowland joined to Kabapiongo; a large landslip, all the surface exposed; loose stones, small and clay.

Very pretty scenery coming along, see the land at the end of the Lake and ought to turn in a day's more pulling: but we want food; the small villages we have been passing do not supply enough, even Makukira was drawn almost blank, so I suppose we shall be detained to-morrow, and shall have to stop for the eclipse. The name of the village to-day where we are to camp is Mikisungy, and supplies are said to be plentiful. 11.5. Passing cape in bay; River Kisungy near village. Food scarce here and dear, and they say further on when Dr. Livingstone was here on his last journey, about fifteen or sixteen months ago, it was plentiful, and the people had many goats, but parties of Wanyamwezi and others had carried off all the goats and many of the people. The slave trade seems spreading, and will no doubt do so in the interior until it is either put down with a strong hand, or dies a natural death from the total destruction of the population. It seems at present to be tending towards the latter. It is spreading rapidly; the Arabs have only penetrated Manyuema a few years, and now they have a settlement close to Nyangwè, from which parties will be able to go still further a-field.

14*th*.—Heavy rain in night, but a lovely morning. Slept well and feel the better for it. Leg better, but still very lame. Chief's name Mpara Gwina. Head chief lives four days off inland. A great deal of cotton manufactured. The chief when I went to see him was employed picking out the seeds and preparing it for spinning. The spinning is done by a spindle about 20 inches long, with a bit of curved wood on the top and a small hook, and from it is wound on to sticks about 4 feet long to use as shuttles in the weaving. Grass leglets and bracelets common, made from the Upindha (baobab) very neatly twisted or plaited. The bows have mostly

a fringe of long hair at one end, some at both, and are sewed over, besides having the spare string wound round them. Arrows various shapes, not feathered or poisoned. All knives shaped like spear-heads. Profile of the people good. Some of the noses are Roman, but when seen in front all have the spreading alæ nasi. Some of the people have their heads completely covered with sofi or pipe-stem beads, each strung on a separate tuft of hair. It must be very uncomfortable, and is not at all prepossessing in appearance, looking like scales. Others who cannot afford beads imitate this by making their wool into blobs, and greasing it until one cannot detect the separate fibres. More food to be got than I thought. The people here had corn some time ago, but the Watuta have killed them all. A few Watuta remain still hereabouts, but they all live in the jungle, and do not cultivate or build huts, and live entirely by the chase and plunder. The people here say "Ba" instead of "Wa," when talking of different tribes, calling themselves Bafipa, Batuta, and so on. Arabs occasionally pass down inland, but no big boats have been down here for years, and the people never saw a sail before we came. The hoes are different in shape and very large, bigger than any ordinary garden spade in England. Chief old, perfectly whitehaired; his office does not seem profitable, as he is certainly the worst dressed of all the people. Forehead and hair daubed with a vermilion powder, and also with a yellow one and a white one. Frontlets of beads. The coloured powders are the pollen of flowers. A tribal mark of raised cuts forming a blotch on each temple.

15th.—Got away at 6.20. Village and River Mundewli 7.15. Village Kasangalowa. I find what I have been putting down as Kapwongo is really the mainland at the south end of the Lake.

Village Mambemba on point. 8.45. River Muomeesa. Getting out of the land of the rocks. On the outside of Polungo Island the rocks are in enormous masses, scattered and piled in the most fantastic manner, vast overhanging blocks, rocking-stones, obelisks, pyramids, and every form the mind can think of. The whole overgrown with trees jutting out from every crevice or spot where soil has been able to lodge, and from them hang long green creepers, 50 or 60 feet long, and through this fringe one catches glimpses of hollows and caves. No one who has not seen it could imagine it to be real; it seems either as if designed for testing the capabilities of a stereoscope, or else for some grand transformation in a pantomime, and one almost expects the rocks to open and sprites and fairies to come out. As one pauses to look at the wondrous sight, all is still, not a sign of life; suddenly the long creepers begin to move, a flash of brown, another and another is seen, and then a party of monkeys swinging themselves along, out-doing Leotard on the flying trapeze; they stop and hang by one paw, to chatter and gibber at the strange sight of a boat. A shout, and they are gone, more rapidly than they came, whilst the rolling echo rivals thunder in its intensity. The glorious Lake with its heaving bosom lies bathed in tropical sunshine or darkened by some passing storm. In places the slightest earthquake would change the appearance of the whole, and masses of thousands of tons would topple down from their lofty sites, carrying ruin and destruction to all before them.

I find it very difficult work to keep my map correctly; the guides change the names most perplexingly, and say an island is a cape and a cape an island, which adds to the bother, and one's ideas are not of the clearest after so much fever and quinine; but by dint of making it up every day, directly I get into camp, I think I have got it pretty accurate. We are now in the debateable ground between Ufipa and Ulungu,

16th, 6.10 A.M.—Detained by the rain. Got away after all at 7.30. A dull grey day, but I expect when the sun gets strong enough the clouds will disperse. It is of no use waiting for the eclipse, as I cannot see what useful

purpose it would serve. Large cotton-plants at camping-place apparently growing wild; but perhaps this has been a clearing at some time or other, and they are the remains. Industrial settlements to teach trades and proper cultivation would seem to be the proper line for missionary work in this country, after the pattern of the French mission at Bagamoyo.

Chalk, or very white limestone, split vertically, the lines as sharp as if they had been cut with a knife. Rounded low point. Cliffs looked exactly as if they had been built by man; I should not like to assert that they have not, as it is only just the point, inside they are quite different; but it seems impossible, besides, although the courses, too, are as regular as possible; where they are bared at top they show a perfectly level unbroken surface, so I suppose they are innumerable small strata. The same sort of thing showing at places, but not so regular. People getting lazy. Deserted village at low point.

2.10. Camped at second village (Lungu). Eclipse commenced when sun was hidden in clouds, and when clear the rain was falling where we are, and two rainbows were formed very perfect; the diminution of light very perceptible. The rainbow went out for three minutes from the eclipse, and then showed up again for a few minutes before sunset. A few people being near had some goats, and some of my men went and stole seven; there were too many mixed up to find out the real offenders. I sent the goats back, and a present of beads for the owner. I daresay if only one had been stolen, it would have been killed and eaten outside the camp, and I should have known nothing of it, and there would have been a new idea of white men left on the minds of the people.

17th.—Got off at 6.20. Land right across on west side, and apparently we are at the end of the Lake, but there is a narrow arm runs up about 20 miles, where it ends in a mass of grass, in which boats cannot pass through. The reason these villages are deserted is on account of some death having taken place. A river called Kirumbwè comes into the Lake at the bottom. Passed a village at 7.15. All hands immediately wanted to stop, saying they wanted food. I told Bombay to get a week's food at the last Kisemgi; and as we are only two days out, it is nonsense talking about food, and the boats are regularly lumbered up with bags of corn, sweet potatoes, bananas, &c.: it is only a fit of laziness. No one knew of this village yesterday, and they were all right for three or four days to a known one, but the moment they saw it all wanted food, and Bombay as bad as any one.

9. Passed Ras Yamini. High cliffs, having all the appearance of ruined ramparts; anywhere else, at first sight, one would make sure that they were, but there is no doubt they are natural, as enormous irregular blocks occasionally showed out; but, at the same time, pictures of the ruined cities of Central America look much the same, as they are not of any great extent, and succeeded by irregular rocks.

10.30. Of course it was all humbug about food. There is a village just in front a great deal larger than the one they wanted to stop at. A few people in here, but nothing to be got. We ought to have reached the village to-day, but the men were pulling so badly that it was killing me to sit in the boat, so I stopped. It is all the small bothers that make the hardship of travelling, just the same as in ordinary life. Real troubles and difficulties one faces as a matter of course, they don't fret one; but lazy men wanting to stop when there is everything in favour of a good day's work, and being told by the cook when one is hungry that there is no dinner, bad water, &c., all these worry one, and try one's temper more than enough. The supposed "long arm" is a myth; there is a biggish river, from what I can make out, and it has a very grassy mouth, in fact, big beard and moustaches. The pipe is a great consolation, and I have told my servant that whenever he hears me pitching into any one he is to bring me a pipe, and light it at once. I have

been able to get no sights, but I have tried, and am perfectly sure of, my dead reckoning. Well this has been hard work since Ujiji, and I suppose will be so, until I get there again. I don't mean physically; but the constant, never-ceasing attention required to prevent mistakes between the different points, and the bother to get people to understand my questions correctly, and having to find out everything after all by my own observation—being told islands are points and points islands; an instance of how hazy a general idea these people have of anything was that, when we first saw the high land at the south end, I was told that it was a large island, name given and all, and I tried to fix it by bearings. We came to the islands of the name given, and found they were quite small, with about half-a-dozen people on them. The guides never can tell the name of any place till they are close to it, and have very little conception of the lay of the land they have coasted along many times; local knowledge is wonderfully good, but anything like a general idea they seem incapable of grasping; but they stare at my big map, and think it a most wonderful performance; and when I tell them that people in England will be able to know the shape and size of Tanganyika, and the names and places of rivers and villages by means of it, I am not sure that they don't think me a magician. My telling them of the eclipse yesterday, before it happened, impressed them greatly. Tingy tingy is the name for the grassy places at the mouths of rivers and elsewhere, where the grass is too thick for boats to pass and not thick enough for men to walk on; Sindy is the name when it will bear men, and the river near Ugaga is called Sindy from this; but they talk of other rivers being all Sindy, *e.g.*, the Kirumbwè is said to be all tingy tingy with a little sindy.

18*th*.—Got off at 6.25. Kasangalowa, Sultan Kongono. 8.50, 175°. Michikichi, or palm-oil trees, for first time since leaving Ujiji. Men coming out with big shields, &c., to see what we are about. River Kowa. The village is in the possession of the Watuta, the proper inhabitants have all fled to the hills. All the men carry bows and arrows, and short spears for either throwing or close quarters, a knobstick, small axe, and shield of skin, 4 ft. by 2 ft. 6 in., oval in form. Very black and naked. Enlarge the lobes of the ears like the Wagogo, wearing bits of gourd and wood in them, sometimes ornamented with beads. Women wear a small skin apron, and behind dispose another skin in a manner more fanciful than decorous, showing their sterns and covering the upper part of their legs, perhaps to prove they have no tails. They seem very friendly to us, notwithstanding their character of universal robbers. Even the little boys carry a heavy knobstick. One man had a very well-carved sheath for his knife.

Wapimbwe and Watongwe live in Ufipa mixed up with Bafipa. Watuta and Wapimbwe live in Ulungu as a wild people. Different chiefs, but allies of the Watuta. Kitimba, chief of all Watuta. Six hours' solid work at mapping, beginning sheet No. 1 of Tanganyika. The women here, who can afford it, wear a broad band of parti-coloured beads round the heads, and another round the waist. The one round the head, whereas in some cases all the hair is shaved off underneath and above is allowed to grow bushy, and looks exactly like a fur cap or Kilmarnock bonnet. All the people chip the two upper front incisors, some all, and extract the two centre ones in lower jaw; tribe mark seems to be a line down centre of forehead and two on temples, some continue the two on temple down to the chin. The stern-aprons are cut so as to turn down a flap, and to allow of the rear view I mentioned above, and it, therefore, must be the fashion to show the part. Some of the men had enormously heavy spears, the butt being larger than the rest of the haft, and made of black wood or ebony to give weight; they are generally used in elephant hunting. The Watuta live by the chase, and settle down in a village, as they have in this one, till all the food they find is consumed, and

the huts they don't use are burnt as fuel, when they make a foray on another, and repeat this little game. None of the regular inhabitants attempt resistance, but seek safety in flight, as when the Watuta fight, it is an indiscriminate slaughter of all. Saw a woman with twins to-day, for the first time in Africa. We begin westing to-morrow, and, I think, a little northing. If we have a breeze like we had this morning, when it was dead in our teeth, we ought to make a good day. I am also happy to hear that we have no camping-place for some distance, so the men must pull whether they will or not.

19th.—Bother getting away on account of tingy tingy. The boats were jammed 100 yards from land and the water was deepish, so we had to get small canoes and go backwards and forwards, and then to pole out some way. One of the women had the turned-down flap of her stern-apron decorated with beads. Precipitous mountains on south-west may almost be called cliffs, with gorges formed by landslips. Waterfalls amongst the hills. Got a breeze from 12 till 2.30, which helped us along well; got in at 4 o'clock. Very few people here. The Watuta have passed, and most have not returned. I am very much afraid that the bay is so deep that all my yesterday's mapping is wasted, unless I cut and put on a new sheet for the lower part.

20th.—One solitary palm-oil tree, and a large sycamore tree. Ground very rough, evidently overflowed by stream when in flood; a place where hippopotami had been rolling afforded a smooth spot for my tent. Rocks in the cliffs are all red sandstone on the top and light-coloured granite when they show lower down. Got up at 6.25. I think the rains are taking off, although I still see showers amongst the hills and hear occasional thunder, and nights are cloudy for sights, but I hope to get a chance soon. I was much interested in one village (Kisunge) by watching a potter at her work. First she pounded enough earth and water for one pot, with a pestle, such as they use in beating corn, till it formed a perfectly homogeneous mass. She then put it either on a flat stone or on the bottom of another, and giving it a dab with her fist in the middle to form a hollow, worked it into a shape roughly with her hands, keeping them constantly wet, and then smoothed out the finger-marks with a corn cob, and finally polished it over with one or two bits of gourd and a bit of flat wood, the bit of gourd giving it the proper curves, and finally ornamenting it with a sharp-pointed stick. I went to look at it, wondering how it was to be taken off the stone and the bottom shaped, when lo and behold! it had no bottom. I waited to see what would be done, and after it had been drying four or five hours in a shady place it was stiff enough to be handled carefully, and a bottom worked in of another piece of clay. I timed one from beginning to pound the clay till it was put aside to dry, and it took thirty-five minutes, putting in the bottom might take ten minutes more. This pot would hold from 2½ to 3 gallons. The shapes of many are very graceful, and all are wonderfully truly formed (like the Amphora in Villa Diomed at Pompeii), used for palm-oil. A sandy patch in bottom of bay, between Kapembwe and Cassowa. Water discoloured a long way out from mouth of the Luguvu. Numerous small landslips and water oozing from the sides of the hills.

Camp a favourite spot with elephants; some of the trees are quite polished from their rubbing themselves against them. Rocks yellow sandstone, and beaches of granite shingle and yellow sand. Saw an elephant down on the beach, but he perceived us, and was off into the bush like a rabbit, shaking his big ears. Camped at 12.45. Men say they are tired after yesterday. Asmani shot a buffalo soon after getting into camp; but unfortunately I had just had a goat killed, which might have been spared another day.

21st.—Very heavy thunder during the night, but no rain. The echoes beat anything I have ever heard. 6.20. Got off; pulled for Kipimbwè.

There was a heavier sea and surf yesterday afternoon than I have seen yet, as it blew pretty hard right on the shore, and it was an open beach with no grass. I got the boats moored off to some sunken trees, and they are all right. It just shows the nonsense of these people keeping on saying, lake bad when first we came out. They don't notice now what would have made them all in a terrific fright at starting. Akalunga name of village, one of the largest I have seen in Africa, perhaps the largest.

22nd.—Very heavy thunderstorms in night. Chief, a very old man, with large white beard, whiskers and moustache shaved. Has a son with a grey beard. A number of Arab slaves and Wanywana here for trade. One Mrima man, who left Bagamoyo soon after us, and Unyanyembe at the same time, and then came direct here, crossing the Lake at Makakomo's, has been here about a month. Ivory 10 dotis a frasilah. Many of the women dressed the same as at Kasangalowa, but there is a good deal of cloth about from the traders being here. Tattooing mostly in straight lines with cuts at right angles. Some people here wear small skull caps made of beads. Old Miriro came to pay me a visit. He put on a fig-leaf instead of the greasy handkerchief he usually wears and a robe of red and black Joho: he wanted me to give him a gun, and to stop and mend a musical box, which only wanted cleaning. Although a big king he has not acted royally. I sent him a very good cloth, and he has made no return present. However, he seemed friendly, and said that the year in which the first white man came here would always be remembered as a great year. I fancy the Wanyamwezi and Wangwana here put him up to asking for a gun. Of course it was refused. He was much astonished at the breech-loaders and revolvers. Food for men plenty here, but I can get no eggs, fowls or milk, or ripe bananas, as they are all cooked and eaten when green. My goat dried up, and they asked me 2 doti for another, as much as is given close to the coast. The Ujiji price is a shukkah. One of the Wanyamwezi began talking of the Portuguese, saying they were a people like the Wasungu and lived on the coast, had two kings, the big one a woman called "Maria," evidently the Blessed Virgin, and that they had houses with her figure in it; the other king was Mocneputo (the African name for the King of Portugal). No pombe here now, but they say in about a month, when the harvest begins, there is plenty. I have not mentioned the granaries of these parts, which deserve notice. They are built on posts, and floors raised about 3 feet from the ground all round, 4 to 12 feet in diameter, and some of the larger may be 20 feet high, exclusive of the conical roof. Those for old corn are plastered over and have a small hole under the eaves for access, which is reached by a notched trunk, used as a ladder. Those for fresh corn are made of 11 foot canes about 2 inches apart, with hoops of the same material every 2 or 3 feet, and thus allow the air to pass through freely, I suppose to prevent heating. These latter are always small. I hope that when we get off to-morrow we shall not have to make a day's halt till we get to Kasenge. Many of the women here, and at Kasangalowa, have not even the usual Negro apology for a nipple, but only a hole. I was astonished at this, and was told that they scar themselves thus for ornament. I pity their babies! I should have thought it too painful a thing to do for that. I had supposed that perhaps it might be a punishment, and still have my doubts on the subject, as it is usually the best looking that are thus deformed. People here make very pretty little ivory combs and sell them cheap enough—4 khete for one. These they use for combing out their hair; when not in use, they are stuck in it, and look rather well. Nothing particular in the arm line. The people wear solid bracelets and anklets of iron and brass, like the Indian bangle, besides the ordinary beads and sambo. Nearly all band the leg below the knee with small circles of plaited grass, which also takes the place of wire, and other ornaments with those who cannot afford the latter. The ropes for keeping

the loin-cloth up are often covered with beads of various colours instead of wire. Many men wear broad leather belts.

23rd.—Under way at 6.25. Good fair wind. *Pickle* made sail by hoisting two loin-cloths and a mat. Ran into the stream to see which way it runs. It proves to come in. Said to come from country of Manbembe and to turn very much. Caravans from Kasenge cross it three times. A very good day's work, but it was nearly all under sail; the men when wanted to pull being even lazier than usual, although they have no excuse, having had a day's rest yesterday. Game very plentiful; but I am so lame, I am obliged to be carried to and from the boat, and can't go out shooting. Horrid little ulcers, and the boil which lamed me on the road to Ujiji has formed a large sluggish sore. I have carbolic acid with me, but can't use it without oil, and the only good oil I am keeping for the wounded man. The Chikichi or palm-oil I don't fancy would do, but I must try it, as I can't go on like this. In addition to my other troubles, I have prickly heat rather badly, and it is a thing that always drives me mad. Numerous little streams and torrents as we came along. Hills bold, but not very high, from 400 to 600 feet. I quite thought to-day at first that the Luwaziwa went out of the Lake. It looked like a clear entrance and in grass, but when we opened it properly there was the regular grass mouth and sand-banks. In addition to the numerous rivers and torrents, I believe the lake to be fed by springs in its bed, as in several places where land-slips had occurred, the water was bursting out between the stones and trickling down into the lake. The country now is like a great sponge, chock full of water, and put to drain, so that it cannot alter its shape. No villages at all seen to-day, all the people living inland behind the hills. I saw some canoes hauled up in one or two places, so the people can't be far off.

24th.—Got off 5.39. A good breeze again helping us along well, though rather puffy down in the vicinity of the hills. Lost an hour, men wanting to stop, and landed. They looted a fisherman's hut, and I had the greatest trouble in the world to get the things back again. Bombay (who told me about the goats) being amongst them, eating their fish, &c. Passed Runangwa Ras and river, much smaller than Malagarazi. Very rocky, high hills covered with trees to their summit, up to 1000 feet and more. Rocks, granite, and light-coloured, soft sandstone. Saw a couple of gorillas (Soko) up amongst the trees and rocks. I thought at first it would be no good firing, but they remained so still that I got the gun, but before I could load they were off. Lazy black fellows, looked bigger than men. They are said to build a fresh house every day. Camped at mouth of torrent bed; too stony. Till 4.25 trying to find a place, but could get none; so all obliged to go further on. Camp opposite Makakomo. No go again. Water knee-deep behind a narrow beach. Passed a small village. No place for boats. 7.30. Picked up camp. *Pickle* not up till 8.45. A very good day's work, and I am happy to hear we have some more like it in front, only I should like to be in, so as to have an hour or so daylight for my map. I cannot see to do it by lamplight. *Note:* There is a set to northward with us to-day, which was against us going down. We are now close to the River Runangwa (or Marungu) of Burton, which he makes at the south end of the Lake, whilst it is about 80 miles from it. Speke was far more correct in his first ideas before he had heard what the Arabs said to Burton.

25th.—Camp near Katupi Village. Ivory here 10 doti a frasilah. Slaves (good) 5 dotis each. A Mangwana here trading, says from Chakuola they get to Unyanyembe in about 20 days. Runangwa close to Ras ditto. Chief, a nephew of Miriro, named Kapampa; more people go to Miriro's to trade, and prices are higher there. Got off at 10.40. Numerous small villages and shambas. Cultivation on sides of hills as steep as the Swiss terrace, only instead of being regularly terraced, there are irregular retaining

walls of loose stones at intervals, and the soil is left nearly at its natural slope. The people at work look like flies on a wall. Several little torrents; hills very steep and rocky. Sandstone and granite. River Lulugo, and camp. Chief's name, Muvindy. Hear of five large canoes from Ujiji being on in front. People's heads, &c., same as before. People seem less afraid; a canoe full came off to have a look at us, and some big man who was going the other way in a canoe with 12 paddlers, was also brave enough to venture a few hundred yards from the shore in order to have a stare.

26th.—Much cultivation and small villages and huts, no stockade, so I suppose the country is more peaceful hereabouts. Hills very rugged. Several torrents. Breeze from S.E. Took in a reef by twisting the tack of the sail into a rope for a couple of feet and lashing it. The second reef, a lashing round of the yard-arm. A pretty good sea running, and the wind aft; the boat is rolling about like a porpoise, and prevents my getting bearings. I am rather anxious to see a good camping-place, as with the breeze and sea now on, the boats would come to grief at once if they touched the rocks. 12.40. Pulled in close to Kanenda to look for a camp. River Kivezi; chief, Karungwe. Village, Mona Kalumwe.

27th.—I heard a great noise outside my tent last night, and all the men being kicked up, so I went out to see what it was all about, and found some of the natives and some of my people squabbling. I found, on inquiry, that some two or three had bought native cloths, and that one had been stolen from the natives, who then came and wanted to take back one they had sold; the stolen cloth was found and returned, but the man who had taken it, Kyuma, had bolted into the jungle; however, I have had punishment parade this morning, and gave him a thrashing, and young Bilah, who was mixed up with it somehow, ditto. Got off at 6.5.

The breeze, instead of carrying us on as it did yesterday, seems inclined to fall light, although there is a pretty considerable jobble of a sea; however, if the wind goes down altogether it will soon get calm.

12.0. Ras Mirrumbi. 0.20. Utembwè shut in. Several torrents; occasional villages. 1. Fell calm, and left the swell behind. Sun very strong. Land on east; inland very high. 2.35. Made sail again. Enormous spiders' webs on some of the trees; one or two almost covered with them. 5.55. *Pickle* not up; I am rather anxious about her.

28th.—*Pickle* not up yet. I am afraid they kept inshore yesterday, and that in the heavy sea they came to grief on the rocks. There is a village half-an-hour off, and we go on there and wait for her, and buy food. If she don't turn up to-day, I must send back to look for her.

Got into camp at 7.30 up a deep inlet near mouth of Lovuma River. Two very large canoes, hauled up under a shed, and remains of a large Arab camp. One pulls 20, the other 18 oars, and are fitted with mast, &c. They are said to be the property of Jumah Merikani, who has gone into Msama's country to trade. He is said to keep a permanent gang of Wanyamwezi porters, and only to stop at Ujiji long enough to sell and dispatch his ivory, and lay in a fresh stock of trade goods. Heads and tails here as before. Wild grapes; the first I have seen. Makowiri, name of village. Mampalu, chief. Knives, &c., imported from Manyema. This is the end of Marungu, and on in front we come to Utembwe, where the people are called Waholololo. Wakatètè, name of a village, not of a people. Jumah Merikani first began to trade past here, when Burton was at Ujiji, so he has been fifteen years at it. Large mosquitoes biting here in the day-time. I am rather uncomfortable at present. My back is covered with boils, so that I can neither sit nor lie comfortably; and my feet are too sore to stand; I have also the prickly heat, which comes up in great patches and makes me wild.

2.30. *Pickle* came in all safe. They got frightened at the sea and wind,

and camped before Kapoppo. Well, I can't blame them for the delay, as they have slashed up pretty well from Miriro's, and three or four days more ought to put us in Kasenge, perhaps less, if we carry the wind up with us. The Lake seems more like a huge river in form than a lake, but this very narrowness diminishes the probability of its having no outlet, as it lessens the surface available for evaporation. High land about Kungwe in sight from here. People here seem very friendly. One jolly-looking old fellow, who is doing duty for chief while the latter is away on a tour of inspection, came and salaamed most profoundly to me, and rubbed dust on his chest and arms, which, I find, is the way homage is paid here.

29th.—Detained by rain. Heavy rain till 10; then, of course, men away, and one thing and another, Bombay saying, "No road where you want to go; plenty of rain," &c.; and we did not get off till 1.30. Rather a swell on and no wind; a struggle going on between the river depositing mud and the Lake washing the shores away. Ras Gona, 305. Last camp, 173. Got into a little land-locked bay at 7.15. Bothering about to find landing-place till near 8 o'clock. Off again first thing to-morrow, I hope.

30th.—I did not have the tent last night, as it was so late when we got in, but slept in the boat, as it seemed a lovely night; but it came on to rain, and I was wretched for two or three hours. At daylight I got the tent up, and am slightly more comfortable; but it is on the side of a steep hill, and everything is on a slope. 7.0. Shifted to proper camping-place, and think the rain is clearing off. In an hour or so shall see how it turns out, and if we are able we must go on. We have got a good sun out, and as soon as things are dry shall go on; the men were even worse off than I was, as, thinking it was going to be fine, they built no huts, but lay out in the open, and their spare gear in the boats was all swamped by the boats being half-filled with water. Got off at 12.30. Bombay in a useless fit. I told him at 8 o'clock I would give them two hours to dry things, and cook, and eat. I waited till 10.30, and then gave him another half-hour, as he said some things were not dry; at 11 I told him to pack up, and after a time, during which I was arranging some things in the boat, seeing no signs of a move, I sung out, "Paka, Paka," some one answered, "Kesho." I looked for Bombay, to find out what all this meant, and found him sitting in the other boat under a sort of awning, and doing nothing. He said, "What can I do? The men say they won't go; they are afraid." I said, "Who? Bring me one who says no, and I'll punish him." He said, "I can't—they all say they won't." Bad legs or not, I was out of the boat in a second, and picking up the first bit of wood I saw, I told one or two to pack and go; they began, and as I went on to the others, they stopped again, so I struck out right and left, and we soon made a clear out. All laziness; and Bombay no more use than a piece of wood, not so much as the one I had just fisted. A nice little breeze, which will be fair when we round Ras Tembwè Camp. After all our bother getting away, the men all seem in a good humour, much more jolly than usual, although one or two got some shrewd knocks.

River Wulhando in bay behind Ras Tembwè. I have found out the reason why the men did not want to come on again; they had heard of a trading party being on the other side of the neck of land, between Ras Tembwè and the marsh, and I suppose wanted to exchange visits. Saw the canoe of the traders and a small party, who have been away from Ujiji for about six months to shoot elephants, but had not had much luck, having very little ivory; they intend crossing the Lake here to-morrow on their way back. Had a parley with them. Passed Rwege Point. Rather a swell before passing Ras Tembwè, but now it is dead calm. Bombay says it is like Mawesi (palm-oil); it is no use making a row about to-day's business, although they did put me in a rage at the time. I have been obliged to chaff Bombay to get him in a good

humour, and he began as usual, when put out, to forget his English and talk Suahili. Land running down low. All the points I took were low and never stretching out, so that the bearings are almost useless except for Ras Mukunbungwe. Ras Rohangi is close to Kasenge. I am promised a hot spring tomorrow, and, I am almost afraid to write it, the day after, the outlet of Lake Tanganyika! Speke did not come quite far enough down; and Livingstone, coming from Cazembè's town, passed its mouth in a canoe, and did not notice it, and when he went to Manyema he never came south enough. It is about a day south from the island of Kasenge; but where it flows no one knows. However, it can't miss the Lualaba, and so joins the Tanganyika to the Lualaba system. D.V., I go down it in small canoes, reducing my men to the number of guns, giving the rest their discharge, and orders on Zanzibar for their pay, and looking out to get employment at Ujiji if possible; as although every pagazi, with the exception of three or four, has at one time or other behaved badly enough to warrant his discharge on the spot, sans pay or anything, still one can't judge them by the rules we apply to civilised men, they are entirely guided by the impulse of the moment. No Arab at Ujiji seemed to know about this outlet, so I am not over sanguine, but it lies just between two of their routes, and just out of both. I think, however, the Wajiji can have made no mistake about my questions, as they have seen how particular I have been about finding out which way the water flows in every stream in which there could be any doubt on the matter. A quarter of an hour lost in looking for camp. 6.35. Passed Ras Kalomwè. 6.50. River Kavagwè, large. Camped. 200 yards wide, and 2 fathoms deep in middle. No perceptible current to-night, but I intend to have a good look in the morning.

May 1*st*.—Lovely morning, so we get off at once. River flows out very slowly. 6.35. The country very lovely, small cliffs and some open land (not the eternal jungle) looking like park-land, with clumps of fine trees running down low. Passing Kanyaweze. Ras Kabogo. Made sail at 6.30. Nearly aft; going along well, 3.5. 7.45. Ras Waggha. A goat-sucker flew across the boat, evidently had lost his way. Suahili name, Lapupara; Ujiji, Rupipa. 9.10. Breeze freshening, reefed. 9.30. Passed 1st Ras Niongo. 2.19. Shortened sail to go inshore and have a look at the hot water. We are now in Uguhha. Well. The hot spring has the very smallest foundation in fact. After about half an hour's tramp, which to me was pain and grief, through very long, thick grass, we came to a little corner on the swampy edge of the lake, where a few bubbles were rising. I tried the heat, and the thermometer showed just the same in the shade and in the water—96°. In the sun much more. I tasted the water, which perhaps had a slight flavour of soda-water, so that I suppose it is a small spring of gas; and the man we got to show us the way asked for some beads for the spirit of the place, of which he threw in two or three, and wisely kept the rest for himself. I was glad to get back to the boat, as the sun was blazing hot, and the long grass shut off all the breeze. I hear here that the river comes into the lake; but never mind, I'll ferret it out somehow. I must, now I have begun, find where the water goes *out!* The chief here is the fattest man I ever saw; I thought at first glance from his pendent breasts that he was a woman, but then I saw he had a beard. I can't make out the guides; they said there was a big river going out of the Lake, called the Lukuga, near Kasenge, when we were passing down at the other side, but now they come up all (directly they hear the natives say that it comes in) and say, "They said they had seen it with their own eyes." The tattooing on the women's bellies is most extensive, and in a rather pretty pattern. *Pickle* not up; skulking behind; afraid, I suppose.

2*nd*.—Thermometer broken yesterday. Box had come to pieces in conse-

quence of wet weather, and in bringing it back from the spring, although I had it carefully wrapped up, somehow it came to grief. Calm. Chief's name Luluki; gave me pombe, and now he and his people assert that the river, the Lukuga, goes out of the Lake. Lots of grass in it. Some faith is to be put in what they say, as they said it went into the Lualaba without my having made any mention of the latter, 1st. Rivers in front before Lukuga; 2nd. Lohunda, Luamiliè (Kaluka chief); then two or three points, and then Lukuga. Well, I feel jollier again now hearing that the river does go out. From the look of the Lake this seems to be the place for it. Bombay (who has now been all round the Lake except the piece between this and Uvira), says all rivers he had seen come in, and from Kasenge to Uvira is an unbroken chain of mountains. Some men came over from the *Pickle* this morning; they stopped because they were afraid, and also a lot said they were afraid after the wind went down yesterday. It is blowing hard again now, but I intend starting shortly, and leave the other boat to come on at night when there is no wind. I am all impatience to see the river. I tried hard to be good yesterday when I heard it came *in*, and remembered "Thy will be done," especially the last verse of the hymn. If the river proves passable it will open a line of water to Nyangwè; and then if we find that the Lualaba goes into the Mwootan Zige, and Baker has a steamer there, we shall have water communication from there to all the Tanganyika countries. I think steamers of small draught towing lighters might come some way up the Rufigi, say 120 miles, and then a tramway to the south-east end of Tanganyika need only be 300 miles long; then by Lukuga to Lualaba, Bemba, Moero, &c. Or up the Nile to Albert and Victoria Nyanza, and then Livingstone's Lakes and Tanganyika. Here is a day wasted by the other boat not being up; but I go on to-morrow morning, even if she don't come. I have sent to tell them that if they are afraid to come by day they are to come by night, when there is no wind. I feel so on the tenterhooks of expectation about this river, that I cannot settle quietly down to anything. God grant that I may not be disappointed! And if it is the case that it is an outlet, I shall take it as a sign, that at length Africa is to be regenerated, that the Almighty of His infinite goodness has chosen me to be one of the instruments of His will: "Let your voice go out into all lands, and your sound unto the ends of the world." The climate up here on the Lake is far better than that of India; indeed, so is all the country except the coast belt and Unyanyembe, and even there it is not so deadly as many parts of India. I believe in a great future of Africa if only the plague of needy adventurers and loafers be kept from her during the first years of her development. What a marvel the Nile is! the link between the seat of the most ancient civilization of which we know and the last part of the habitable globe to be brought under the influence of modern civilization! I hope that the great work may be given to Christian England, and not left to the Mohammedan ruler of quasi-slaves. Findlay, although he is correct in supposing the Tanganyika to be higher than Speke makes it out, as might have been supposed from the index error of his first-expedition thermometer, seems to have arrived at this from false data, and to draw wrong inferences in regard to the level of the Albert Nyanza, Gondokoro, &c. Speke made Kazeh practically the same height on both expeditions, and very likely his first observations of the height of the Victoria Nyanza were corrected by this height, which was supposed to have been obtained with the proper thermometer which was broken. The index error obtained at Kew for Sir S. Baker's thermometer may have arisen after the levels were taken, otherwise we should add 1000 feet to Kazeh and Victoria Nyanza by the same chain of reasoning as Mr. Findlay uses to raise the Tanganyika. Much more probably Gondokoro is about 1300 feet and the Albert Nyanza about 2000 feet, allowing for the rapids and falls on the Nile, is quite enough to give the current of the river; if

the fall were very great the inundation of the Nile would take place much sooner than it does, but it begins in March, and therefore the retardation of the floods is considerable, owing to the retardation from the gentle slope of the bed. Rains begin in 11° s. to 9° s. in about October, and two months are required to bring the country to its normal state; say water increases sufficiently to enlarge river, then to reach Cairo, a distance of 3000 miles in latitude and nearly the same in longitude, after allowing 30 per cent. for winding of 3300, sixty days gives 55 miles per diem for flow of river, or $2\frac{1}{4}$ miles an hour, which is fully the rate of the current; then the waters are increasing at Cairo till either the end of July or beginning of August, when they reach their highest point about two months after the rains here cease, and continue to fall until the inundation ceases, I think in October. I am writing now without book, but I think that the retardation of the inundation has never been sufficiently taken into account by the theorizers on the Nile sources.

3rd.—Made sail at once to a slashing breeze freshening up from eastward; passed Ras Niongo.

The wind good, but does not seem inclined to blow so hard as it has done the last two or three days. I have no doubt that these winds are from the south-east, having set in on the Mozambique, and will bring the dry weather, losing their moisture in passing Ugogo, Rubeho, &c.

7.30. R. Nguhha (or Lohunda). Burton talks of the exaggeration of the Arabs with regard to the sea. When I stand upon the poop my eye is at least 7 feet above the water, and many waves passed far above the horizon, I should say 12 feet from trough to ridge, *i.e.*, a 6-feet wave is not uncommon when blowing hard and with a fair distance of open water.

9.15. R. Lubisi. Low cliffs of a deep dull red; seem soft, with several small landslips. The hills turn right back from Kasenge and the same to the south of us; Ras Mirrumbi was the end, and since then we have been running the land lower and lower and no high land appears behind, so I am in hopes, although they are mingled still with fears and doubts; but all will be settled in an hour or so.

11.10. Passed Ras Kampanda.

11.40. Got into Lukuga. Well, first of all when we got in, the river seemed to be a myth again as regarded its leaving the Lake; there certainly was a slight current setting in, but that might have been caused by the wind and sea outside, and a native who showed us where to camp said that in half a day it came to a big hill and came to an end. When I said there was no big hill, he said that it only went a short way into the country and was not a river at all, but a part of the Lake, and that I could go and see that what he said was true. This was disheartening; but when the chief came to visit me all was altered. True the navigation is difficult, lots of tingy tingy and sindy; but it is true that it goes into the Lualaba; his people travel a month by it (I am not quite sure if *on* it) on their way to Nyangwè to trade, but no Arab has ever been down it. It apparently falls into Lualaba above Nyangwè. At the last place also I was told that the river came out until the chief came. I expect they don't want to have all the Wajiji and Arabs coming up here. If I had a glass of grog I'd drink it in honour of the discovery, but not having it, smoke a pipe instead. I think it ought to be called Rawlinson's Lualaba (following Livingstone's nomenclature) after Sir H. Rawlinson, who was President of the Royal Geographical Society when I left, if he does not object. Fancy Burton, Speke, Livingstone, Stanley, having all missed it; it is only one day from Kasenge, and that a short one: the reason the Arabs have missed it, I expect, is from the reports of the people being so contradictory that they have paid no attention to them. Well, if the Lualaba is the Nile, it has the most extraordinary course of any river in the world. I determined

when I left Ujiji not to be beat if I could help it. The Kitangule and Malagarazi rising close to each other, and flowing contrary ways at first, to be united after all in the old Nile is extraordinary. Findlay was right in his conclusion that the Tanganyika was one (though not the southernmost) of the sources of the Nile, although his premises and chain of reasoning were wrong.

4th.—Raining hard. No start down the river yet awhile on account of the rain, but I am in hopes that it will soon clear sufficiently to enable us to get on. The first place where I have seen any likeness to idols. Several of the men wear round their necks a little figure, with a head carved and its hair done like theirs, and the rest a sort of cone with rings and two or three feet, and a hole through the neck for the string by which it is hung. It is medicine, so I cannot get one. The only other figure I have seen was the centre leg of a stool at Mkasiwa's, chief of Unyanyembe.

Went four or five miles down the river, three to five fathoms deep and 500 to 600 yards wide, but we were stopped by grass; however for small canoes a way can be cut. Chief went with us and promises all assistance in his power; talks of going down with me, &c., and will send his men to cut the road through the grass, and in fact is as civil as possible. He gave me a couple of fowls and some flour in return for my cloth; brought three of his wives to look at me, to whom I gave some beads. There is a sort of bar across the entrance caused by the washing away of the shore outside.

5th.—Got off 6.30. Ras Kohangi, 41°. I make the distance across the river at the beginning 1·5 mile, but most of this is closed by a grass-grown sandbank, leaving only a small entrance at the southern end, where there is a bar on which the surf breaks pretty heavily at times; least water, however, is 1½ fathom. Inside, 3, 4, and 5 fathoms are obtained. I got 3 fathoms close alongside the grass which barred our progress. I wanted the chief to commence cutting a road at once through the grass, offering to leave beads to pay the men; but he said he couldn't get men to work without pay, and that he had rather not have anything left, as his people would say, "Oh, you take all these things from the white man, and only give us a little and make us work for it;" but that when I came myself I could pay the people who worked every day, and then they would understand. He said he would like to have a trade-road pass by his village, as now no one ever comes there, and they can only get things by sending for them. Numerous wild date-palms down the river. After pulling an hour and half the breeze freshened up almost in our teeth, so I put into a convenient little inlet. This I find to be part of the other river, at least it is all swamp or marsh, or low flat plains, inside a long bank, with some small openings; deep water in places, shoals, sandbanks, and long grass, &c., inside. I suppose the bank is formed of all the drift matter of the lake, which of course gravitates towards its outlet and, there not being a fair passage for it, forms the banks and morass. A fair instance of it has been going on during the 7 or 8 hours we have been in here; a large quantity of driftwood has come in and worked away into the grass, without leaving any sign of its passage. I am sure where logs 20 or 30 feet long can go, ordinary canoes can go too, without an inordinate amount of labour. Got off again at 3.45. This inlet in which we have been is only a little break in the bank, and the water works away through grass, &c., into the Lukuga. The Waguhha do their heads up very elaborately; they divide their hair into four parts and strain it over pads, and then make the ends into four plaits, work in false hair when necessary. These plaits are disposed in a cross, and numerous skewers, &c., of polished iron are stuck in round the line where the hair begins; those who can get them wear a double row of cowries. They stick the knives they use for tattooing into their hair, and have polished iron strips put in, so as to form a crossed arch like in a royal crown, and wear little extinguisher-shaped ornaments at the end of the plaits; some have large flat-headed iron pins, others

ivory and shell-headed ones. The plaits are plastered with red earth and oil, so that they look quite smooth. On the whole it has a very pretty effect, but it is a very dirty fashion. I heard from the chief that halfway to the Lualaba this river receives another, called the Lurrumbudgee. Some of the Waguhha men do not do their hair so elaborately, but instead of plaits twist their hair into the form of four ram's-horns, the one in front being turned backwards.

5.3. Passed village of Masekôvi. Many villages on the plain. Passed Ras Rohangi. 8.10. N.N.E., Ras Matembwe, 19¼ miles. 9.45. Ras Kimnos, N. by E. ½ E. Clothing, grass-cloth, brought from Rua and Manyema.

6th.—Got off at 6.10 to shift berth to Kasenge. Went in to (W.) where some Wanyema were supposed to be, but they had all started 3 or 4 months ago for Manyema. No one has come by from Ujiji since we left.

Passed Kivisi Island. Camp 3.58, arrived 10.5, Mugwesi.

I have just heard a most extraordinary story. I sent for the Wajiji guides to ask something, and they gravely informed me that the Rusigi, or Lusigi, and Lualaba are one river! and that the Lualaba turns round so as to come into Tanganyika! They say they have known Wajiji who have been to Lualaba by Rusigi. One has been to Moero, but he went through Marungu. Nothing of consequence all day. The only thing I find here is, that the number of islands is much greater than that given by Burton. I forget what Speke says, and have not his book: he is correct in describing Kasenge as being bare of trees (it is, however, very fertile), whilst the others are well wooded. Kivisi (or as he has it, Kabizia) is one of the smaller islands.

7th.—Got off at 11.40. First of all the Wajiji wanted me to stop this morning to see how the day would turn out; and then when, at 9 o'clock, I ordered the start, Bombay kept on saying: "See how the wind is; you will have to come back when you get outside. You will not be able to go." So that two hours were wasted. Going along well. Men pulling better than I have ever seen them yet. Got a nice little breeze to help us on our way. Got into camp just beyond Kabogo. Distance from Kivisi Island to Kabogo 24 miles. Very good work, as although we had a little wind to help us it did not last more than an hour. A lot of Wanguana (Syde ibn Habil's men) here, on their way to Manyema; no news at Ujiji; the men I sent to Unyanyembe not back yet, and the loads (I had been obliged to leave them) not come up.

8th.—Off at 6.5. Soon got a breeze, which is carrying us along well. Camped at Kabongu at 11.45. Passed an Arab canoe going south. Heavy shower passed over from S.W. about 1.30. Got off again at 3.45. The men all wanting to get back to Ujiji; we go on to Jumah Merikani's to-night, and reach Kawele, I hope, in the middle of the day to-morrow. Well. Things from Unyanyembe come or not, I go on as soon as possible to follow the Lukuga. The people at Ujiji are just thinking of making their start; the people we met last night were the first of this season's caravans. There were 4 boats when we came in and made 6; 1 from south about midnight, and 2 from north about 2 A.M., making 9 in all. Got a little breeze again. I shan't mind a few days of Ujiji fare and lodging, and the society of the Arabs there is something of a change, although one's conversation is rather limited. If I can only get people to work we ought to be off in a week or ten days, but the difficulty is to get a start out of a comfortable place, and every one with whom one has to do is so awfully dilatory. However, I shall avail myself to the full of Syde Mezrovi's offers of assistance. I am greatly bothered by dishonesty on the part of Bombay, or wholesale theft amongst the men—I think the latter. We have used 4 frasilah sami-sami, and 2 of blue matunda, besides opening a bale of gulabi and 1 of yellow matunda. The sami-sami alone ought to have sufficed for 100 men for the time we have been out, but I can-

not find out the thieves. Bombay says he only gave the posho* I ordered, and that two men have always been in the boats to look after them. I know, however, that the boat has often been left without a soul in her. But I have had my own time always fully employed with mapping and Journal, and I have also been so lame that I have not been able to look after things as I could have wished. It is an awful bother, as it throws out all one's calculations most dreadfully. I have at last got some good oil, and am doctoring my feet and legs, and trust the carbolised oil will work wonders. I had 9 sores on one foot below the ankle. I must see about getting canoes. My Wajiji say one can get a canoe to carry 20 men and their loads for 20 doti. The men are showing me what they can do; they pulled right up to Ujiji, a mile or two from Kawelè, arriving at 1.5 A.M., and the other boat at 4.30 A.M.

9th, 6 A.M.—Men all alive again this morning. We got off quick, and pulled into Kawelè all right. Here I have been gladdened with letters from home, although nearly a year old; last date July 20th. A note from Murphy, who was at Mpanga Sanga on January 12th, but no letters from Dr. Kirk, and none from the Royal Geographical Society! Arab says afterwards he was speaking of the Rugumba, which comes into the Lake a little north of Lukuga. The Lukuga certainly had a distinct current out of the Lake. When I was there I got the boat in a place out of the wind, and she swung round to the current quickly; and bits of wood, &c., which I threw overboard, and timed to test the rate, gave 1·1 to 1·5 knots. Certainly there had been heavy breezes for some time up the Lake from the south, and when we were in there the wind, for part of the time, was blowing right up the river; but I can't believe in a wind-current setting back a river to that extent.

10th, 7.15.—All hands, or nearly all, managed to get drunk yesterday; and now I have a complaint that they went into a woman's house and took her pombe from her. Bilal, the younger, made himself particularly offensive outside my verandah.

I hear the men I sent to Unyanyembe are about Uvinza with an Arab caravan; they were attacked by Mirambo's men (or heard of them) on their way to Unyanyembe, and went round by Kowende, instead of taking the direct route. I find my donkeys reduced to four during my absence, my riding donkey being amongst the defunct ones. I have rated Margani an askari, as he is among the best men I have, hard-working, and I think honest, and also has a good deal of sway among the men, which he usually uses for good. Bombay, when I sent for him this morning, sent to say he was sick; bad head. How they manage to get drunk on pombe I can't make out.

I have been having a long yarn with all the Arabs who know these parts, Mohammed ibn Salih, Mohammed Bogharib, Syde Mezrovi, Abdallah ibn Habib, and Hassan ibn Bogharib. They all assert that the Lukuga does not go out of the Lake, and that it ends in a marsh. *No* river, according to them, leaves the Lake; but afterwards I took them over to the unvisited Lake, Ugarowwa, as they now call it. I tried to get a map drawn of the direction of the rivers, but they all seemed confused. From what I can make out they think it is the Congo, though where they get this idea from I don't know. One man said he went due north (!) 55 marches, and came to where the water was salt, and ships came from the sea, and white men lived, who traded much palm-oil, and had large houses. These statements look like the Congo, and west coast merchants, although the direction evidently is wrong. Fifty-five marches may be called 500 miles + 300 to Nyangwe = 800, gives about the distance of the Jellala Falls. I tried to get a map drawn amongst them, but north and south, east and west, and all distances were irretrievably lost in a couple of minutes. I don't know what to make of it. The Lukuga *is* the outlet if

* Daily pay in beads.—ED.

any; it tastes the same as the Tanganyika, slightly salt (not salt, but peculiar), and *not* fresh, like the other rivers; but the more I ask about it, the more contradictory do the answers become. I believe in what Bombay tells me, but every one else I cannot trust in anything. My servant is very intelligent, and knows English well, and is a first-rate interpreter; but he never was in the interior before, and of course can give me no original information. I quite fancy that the Lukuga may not be the real outlet; but where does *it* go? where does all the water go? the rain (falling now heavily), where does it go? Above, the Lukuga may prove to be only a marsh, but I believe it will prove to be the Ruama, or Luama, into which the Lukuga flows. I have been talking again about the unvisited lake to Abdallah ibn Habib and Syde Mezrovi, and palm-oil and cowries are mentioned as being amongst the trade articles, ivory, brass, wire, beads. Poor dear old Livingstone had got hold of the Congo after all. They tell me they don't want to talk about it here, and that all that I have been told is a mistake, intended to mislead; they see I do know something, and don't want that something to be much. They say they will tell me *all* when on the road, but they are afraid of having too many people up there, and that already it is getting too crowded for them, and they don't know where to make fresh openings; they know of the Egyptians, or, as they call them, Toorkis, to the north, and don't want to clash with them. Hassan ibn Bogharib offered to take Livingstone where ships come from Nyangwe, for 1000 dollars, but he refused. It is enough to make the clearest mind puzzle-pated; but English sailors don't like to be beat. They say I can get a large canoe near Nyangwe, and go all the way from there by water. Journal up, thank goodness! Maps and letters to-morrow.

Of course here is another bother. Bombay and my servant don't agree, and the latter wants to leave on account of it. Bombay is all very well, but not the "Angel" of Colonel Grant, or the "Devil" of Stanley. I have always found when I have given in to him, that I should have done far better to have done what I first intended. Bombay does not like to think that any one has my ear but himself. He is as jealous as the green-eyed monster itself. He ran down and slandered Issa, and now he has made accusations once or twice against Mohammed Mahi, which I have found to be false. However, I must put up with Bombay's failings, for I should lose a lot of men if he went off.

11th.—I started from England firmly believing in the identity of the Lualaba and Congo, and at last converted poor Dillon to the same ideas; but somehow, since the news of Livingstone's death, it seemed a treachery to his memory to go for the Congo, and I became a firm Nileist, and am now a waverer. Reason says Congo, inclination says Nile; although, if I prove the Lualaba to be the Congo, the Nile question is really solved—the Albert Nyanza receiving a network of streams, besides the Somerset, and emitting the Nile. I hear now, although I could not get any information when here before my cruize, that the level of Lake Tanganyika may vary from 8 to 10 feet between the end of the rainy and end of dry season, and that the rivers become much diminished in size; the rivers that come into the Lake, and are now 3 and 2 fathoms deep, may then be forded in safety.

I believe in the Lukuga still, but expect that in the dry season, or when the Lake is at its lowest level, very little water leaves by it. Arabs now say they know Lukuga; it joins Lualaba between Moero and Kamalondo, after Nyangwe. Lualaba is called Ugarowwa, big river, in places as wide as Tanganyika, full of islands, some large, having 500 and 600 *men* living on them. I hear the letters I have received here were taken off the body of a dead Ruga Ruga, who attacked an Arab caravan and who was shot. More confirmatory evidence about the Lukuga. The chief of Kasenge was at Syde Mezrovi's just now when

I went down there. He knows it well, and his account says, as above, that it goes into the Lualaba above Kamalondo. The Arab who said he had crossed it, now says he was speaking of the Rugumba, which comes into the Lake a little north of it. Altogether I make, in my part of the Lake, ninety-six rivers coming in (besides torrents and springs), and one, the Lukuga, going out. Hard at work at map all day. Very heavy thunderstorm. I showed Syde Mezrovi my Suahili tales, and wasn't let off under half-a-dozen. I had a large audience; and from the amusement they seem to afford, I am afraid I have let myself in for an every day business.

12th.—Heavy rain during night. I hear that Mohammed ibn Suleiman, the Askari I sent to Unyanyembe, shot a Ruga, after two days' fighting. I am afraid I shall have to give up my idea of cutting away the grass on the Lukuga, on account of the expense; in some parts the floating sod is said to be 6 feet thick, and that as fast as you cut away at the top it floats up from below and from underneath the adjoining grass. I don't so much mind, as I should not have been able to get beyond Kamalondo on account of falls in the Lualaba. I am going over as soon as possible to Kasenge, to leave my men there, and go on with a few to have another look, and then back to Kasenge and on to Nyangwe with Syde ibn Mezrovi and Abdallah ibn Habib. I ought to reach Nyangwe about the beginning of August, and if all reports are true, ought to be at the Jellala Falls about the end of October or beginning of November, perhaps sooner, if I get a canoe to go down the river in. Current of 3 knots and 2 knots, pulling for six or seven hours a day, gives 30 miles a day; say travel five days a week, gives 150 miles a week; six weeks 900 miles, near about Jellala. Map up: letters written.

13th.—Very busy all day; made up a box to send home with Livingstone's things. Beads diminishing at a fearful rate. I must see what I can do to get away as soon as possible; I am only waiting for the men back from Unyanyembe. Two solid hours this evening reading Suahili tales to the Arabs, who enjoy it thoroughly; it does me good, though it is very tiring work, but it repays them somewhat for the kindness they have shown me, and I am therefore glad to do it.

14th.—Trying to get things in trim for moving. Arabs holding a court of inquiry about a fight between two of them on their way from Unyanyembe here. Read Suahili to them in evening.

15th.—Some people, by way of amusement, or more likely to be able to steal in the confusion caused, set fire to Bilal's house during the night, fastening the door outside. The men who usually slept in the house were up here on guard. We have not been able to find out the offenders. Arab court still going on; it was not a fight, but the son of Munya Heris ran a sword through the arm of a slave belonging to another man. Writing letters, getting information about beads for road. Reading Suahili in evening.

16th.—Had a sale to-day of my Joko and big clothes; for common clothes I managed pretty fairly. Spare mosquito curtains and all went. I found, however, that to give my men some clothes, besides beads to some men going to the coast, and pay Wajiji for bringing back canoes from other side, I had to get more cloth (15 pieces of 9 dotis each, at 28 dollars a-piece); and, to prevent the *certainty* of starving, I got 20 frasilah of beads. I had to give 50 dollars a frasilah—a large price—but it is a case of "give it, or give up the work." If I had not been robbed, I should have been able to do very well; but theft and the non-arrival of the stores which I left behind, compel this; but when on the other side "I shall burn my boats," metaphorically speaking, and there will be no retreat or looking back. Bombay away all day, and came back drunk.

VIII.—*Trade Routes between British Burmah and Western China.* By J. Coryton.

[*Read*, March 22nd, 1875.]

Ever since the opening of the Canal at Suez the question of a direct road from the Bay of Bengal to Western China has been receiving increased attention. The revolution achieved by the use of steam, now in general use in Eastern waters, has rendered us impatient of delay in travel; the merchants of India and Indo-China declare their ports to be suitable emporia for China trade, and merchants at home listen willingly to any schemes by which the dangers of the China seas are to be eliminated from their calculations. Although the subject in this form has but recently attracted the attention of the public at home, the Government of India has, for the last half century, omitted no opportunity of gaining an insight, through actual inspection by competent officers, into the disposition and resources of neighbouring States, and the facilities afforded by the formation of the country for the establishment of routes which should "tap" Western China.

In the absence of regular surveys of the country it is proposed to cross, we must still rely on history for our conviction that no obstacles arising out of the physical conformation of the country exist. For five centuries, if we can credit the Chronicles of Ava, trade was maintained between Burmah and China by way of Bhamó, and enormous armies have from time to time swept, in their career of devastation, along the very tracks we are hoping to see traversed by caravans of traders. Our ignorance of the physical character of the broad belt of country we are desirous of traversing is therefore of small moment, and our maps give us, no doubt with sufficient accuracy, the position of the leading mountains, rivers, and towns. It is our ignorance of the political status of the population we have to deal with that constitutes our real hindrance, and has hitherto caused the failure of our attempts. Those who know the care with which official returns are prepared by the Indian Government will understand how utter that ignorance is, when they learn that until last year the form containing the particulars of our political relations with neighbouring States was sent by the Local Government in blank, for the simple reason that the British authorities were unable to say who their neighbours were. An article in the 'Times' of March 22nd, 1875, showing how, under one of the ablest administrators of our day, Sir Arthur Phayre, "some 1000 square miles" were excluded from

British sovereignty "by some error" in a map compiled by officers of great Indian experience, will do more to suggest the origin and extent of this chaos in our geographical knowledge than anything I could say.

Now it so happened that it was my duty for some years to speak with authority—I will not say with confidence—on this very subject of the geographical boundaries of States adjacent to British Burmah. In the Court of the Recorder of Moulmein, suits were continually before me involving rights to timber felled on the banks of the Salween, far above British jurisdiction. Each party claimed to have acquired his rights by purchase from the Forest Chief. Finding the difficulty in which I was left from all official recognition of neighbouring States embarrassing, I stated a case for the opinion of the High Court of Calcutta; and the opinion of that Court was that I was bound to determine, as a fact, who was sovereign in the locality in which the timber had grown. The result of having to take judicial cognizance, for this purpose, of the petty skirmishes constantly occurring in the forest districts where the rudest state of society prevails, was, as may be supposed, occasionally absurd. In one case, a forest chief, to make his sovereignty (which I think I had declared established) the more unquestionable, sent to Moulmein, and had a hand-stamp manufactured with his titular honours; and this he was in the habit of affixing, after the fashion of a sign-manual, to documents evidencing the purchase of timber felled within his territory. As a rule, it would be difficult to define these petty sovereignties more exactly than by saying that the chiefs admit in every case some sort of allegiance either to China, Burmah, or Siam, and, as was evident from the careful records of the exploration on the Mékong in 1868, not unfrequently to more than one at the same time.

There is one characteristic of the people inhabiting the belt of country we are considering, which tells either in favour of or against our scheme in precise proportion as the country is tranquil or disturbed. I refer to their love of a wandering life, which makes of the Shan an admirable trader when law and order are prevalent, but a very unpleasant neighbour in cases where the country is unquiet. One of the great objects of our Government in Burmah has been to counteract this restless spirit; and in his last Report, the Chief Commissioner of British Burmah notices with satisfaction the fact that the hill-tribes of Northern Aracan had been undisturbed by the raids of trans-frontier tribes during the year, and that the condition of the tribes within our territories had continued to improve, in consequence of the comparative quiet there existing.

"Our relations with the tribes beyond our administrative frontier," the Report says, "improve year by year. The Koons, formerly the most troublesome tribe in our neighbourhood, are now engaged in friendly intercourse and trade with our people. Messengers arrive during June from the Shindoos, who inhabit a tract of land considerably to the north of the Aracan tracts, and they express a desire to enter into friendly relations with the Superintendent. There is, in fact, every reason to think that the principles laid down three years ago for the administration of these hill-tracts are proving very successful in their practical results. Our own subjects are devoting themselves to agriculture, and they obtain a ready market for their tobacco, cotton, and garden produce, while we hold out every inducement to the tribes beyond our boundary to abandon their present restless life, and turn to trade and barter."

Mingled with the motley population of Shans, in the belt of country south-west of Yunan, is one element of which we may regard the increase in the neighbourhood of Bhamó and Mandalay with great satisfaction. I refer to the Chinese, who, having left their country as emigrants from the Eastern ports, have gradually established themselves as coolies, cultivators, and traders along the coast of the Malay Peninsula from Singapore to Rangoon, and so up the Irrawaddy to the very spot to which we are hoping their brethren will come overland to meet and trade with them.

To the obstacles arising out of this political chaos existing outside Western China, we may add the utter disruption of society within it, the consequence of Civil war. In 1855 the Province of Yunan rose in rebellion, and sustained its independence under a Mussulman governor until 1873. During the period of this rule, bands of marauders, under petty chiefs, devastated the country on the frontier, and hurried the few unfortunate traders that crossed their path to an extent which threatened to annihilate all trade.

If Tali, the citadel capital of Western Yunnan, to which almost all the routes converge, be, as has been supposed, the Yachi of Marco Polo, the character and religious belief of its inhabitants have been for centuries in opposition to that of the rest of China. Writing in 1595, he describes them as a mixture of "idolatrous natives, Nestorian Christians, and Turks." During the last few years of Sultan Soliman's independence, Tali was the centre and key of the rebel power. Soon after the outbreak of the rebellion, the Mussulman troops attempted to push their successes southwards, but met with a repulse from the Tsaubwa of Kiangtung, and retreated, laying waste the towns of Esmok and Yunnan Sen. For ten years the rebel power was confined to the

northern portion of Yunnan. It was at this time, just as fresh exertions were being made to extend it southwards, and we ourselves were prepared to believe that the rule was permanently established, that it suddenly collapsed. Mr. Margary, writing from Talifoo, on the 18th December, announced his entry into that town, with the sanction of the authorities of Imperial China. "I am elated," he writes, "at my success; I have opened Talifoo, and vanquished the dragon which guarded its gates." In a former letter he had given a sad picture of the desolation produced by the long protracted war.

We come now to the natural features of the country we are to cross. The plateau of Yunnan, which is between 5000 and 6000 feet above the sea-level, is intersected by streams which, in their course, acquire the names of the Irrawaddy, the Salween, the Menam, the Mékong, and the Sonkoi. To the north are the huge barriers of "terrific snow-clad mountains" (as they are termed by the only Englishman who has probably ever crossed them), which preclude all ordinary intercourse between China and Tibet.

Having thus noticed the general condition of the country and the people we have to deal with, I will mention, in an order from west to east, the routes that have been attempted or proposed. These routes are very numerous, but may be divided into thirteen groups:—

1. Cooper's project for entering Tibet from the Brahmaputra.
2. From Sudiya on the Brahmaputra to Bhamó.
3. Route from Calcutta to Bhamó viâ Munipoor.
4. Akyab route to Mandalay.
5. The Irrawaddy route to Rangoon.
6. Sprye's route from Rangoon to Kiang Hung.
7. Route through Tongoo to Rangoon by canal and rail.
8. Various routes starting from Moulmein.
9. The valley of the Menam.
10. The Mékong.
11. The Sonkoi.
12. The Sikiang.
13. The attempts from Shanghae to march directly westward on Talifoo and Bhamó.

First in this order we come upon the track of a very indefatigable labourer in the establishment of trade-routes. In 1870 Mr. T. T. Cooper, who had been struck on a previous visit to Tibet with the opening that country offered to the tea-planters of Assam, determined to proceed by the way of the Brahmaputra to the southern borders of Tibet, at the extreme east of which he hoped to find means of turning south and getting

through Tali to Burmah. Passing up the Brahmaputra as far as Debroogurh, Mr. Cooper skirted the river among the Mishmee Hills until, prostrated by fever at Puna, he was compelled to retrace his steps and abandon his design.

Other projects have been formed, and attempts actually made, to reach China from Assam by the more southerly routes from Sudiya, on the Brahmaputra. Those desirous of following in detail the steps taken by order of Government for this purpose, will find much that will interest them in a selection of papers regarding the 'Hill Tracts between Assam and Burmah,' printed at the Bengal Secretariat Press in 1873. In the year 1826, Messrs. Wilcox and Boulton, starting from Sudiya, passed along the valley of the Nam Lang to the town of Mantchi, the head-waters of the Irrawaddy. They were unable to reach any point eastward of Mantchi, and though within 20 miles of the meridian at which the survey of the Jesuit missionaries of Yunnan had just terminated, were compelled by the jealous vigilance of the Burmese authorities to return without having been able to traverse the intermediate space. The subsequent researches of these officers, together with those of Captains Bedford and Newfville, have done much, however, to dispel the mist that had previously rested on that locality.

The route said to be most in favour with the Calcutta merchants is that which it has been proposed to make in a direct line from Dacca through Sylhet and Munnipoor to Bhamó. Of all these routes having Calcutta for their base, we may safely say that they are premature, and can only be usefully surveyed when Bhamó, the point for which they all make, has become the end of a road which is clear of obstructions into China.

The same remark applies to Chittagong, which, although favourably situated in other respects, has too little water to play an effective part as a terminal port.

The pretensions of Akyab have been strongly urged, and the Society is indebted this evening to a public-spirited member of the mercantile community of that port for the map before it. Mr. J. O. Hay thus sums up, in a letter recently addressed to the Associated Chambers of Commerce of the United Kingdom, the advantages of his route—that the line from Akyab to Mandalay is the shortest; that Akyab is the finest port in the Bay of Bengal; that the line will pass through a country rich with coal and iron, and producing cotton, tobacco, tea, indigo, &c., in abundance. Admitting the excellence of the port, I fear that for the present, and until the route by way of Rangoon is brought into successful operation, the great range of the Yomadoung Hills, the lowest pass of which is over 4000 feet in

height, will cause the consideration and the claims of Akyab to be postponed.

We come next to the Irrawaddy, with its ports of Bassein and Rangoon. The adoption of either of these ports is a mere detail in the Bhamó scheme, and I shall consider it therefore with reference to Rangoon. The route by the Irrawaddy follows the course of that river from Rangoon to Bhamó, a distance of between 600 and 700 miles, and passes thence by way of Manwyne and Mômein, or Tengyechow, to Talifoo. The following extracts from the last Administrative Report, issued by the Local Government of Burmah, set out the reasons for which this route has been selected for its support.

"Since the suppression of the Panthay rebellion, the commercial intercourse between the province of Yunnan and Bhamó is steadily increasing, and the Chinese firms in Rangoon are establishing branches at the last-named mart. The Burmese Government seem inclined to run their steamers between Mandalay and Bhamó; and, indeed, from all sides it is apparent that this route, the traditional western entrance into China, is destined to develop far beyond its condition at any previous point in history. The Rangoon and Irrawaddy State Railway, for the construction of which sanction has been accorded by her Majesty's Secretary of State, comes most opportunely as the most fitting exhibition of the determination of Government fairly to take in hand the thorough establishment of rapid and direct communication between the coast and the great inland markets."

The town of Bhamó, which serves as the starting-point of the route, is on the left bank of the Irrawaddy. If tradition is to be trusted, the place has before now been the scene of busy English trade. From inquiries on the spot, Mr. Bayfield was induced to consider there might be truth in the popular tradition, which identifies an old ruin a day's march to the north-east with a factory established by the English somewhere in this neighbourhood, as early as the seventeenth century.

This route, as far as Bhamó, may be said to be all that can be desired. The steamers of the Irrawaddy Flotilla Company make the journey from Rangoon in nine days and return in four. The difficulties of the route consist, as we have learned by experience, in the liability to attack by the tribes bordering on it between Bhamó and Mômein. If Major Sladen, who had good opportunities of judging, is to be relied on, "130 miles of railway between Bhamó and Mômein would effectually tap the resources of Yunnan." The direct distance between Bhamó and Mômein is given at 122 miles, so that the railway spoken of, if feasible, could not be said to be one of uncommon deviation.

Beyond Mômein we need hardly trouble ourselves with the question of communication, that town being connected with the principal towns of China by paved roads.

The history of the two expeditions we have despatched by this route is well known. Major Sladen's expedition in 1868 was for a long time detained by the hostility of a Kachyen chief in Ponsee, a village 10 miles westward of Manwyne. In Manwyne itself he was hospitably received, and was welcomed by the Mussulman Governor in Mômein, at that time in rebellion against China. From that point he retraced his steps, and no further action was taken until the expedition of the present year, organised under Colonel Browne. The history of this expedition, after its starting, is at present but imperfectly known. It was attacked at Manwyne by Chinese and Kachyens. Mr. Margary, a member of it, was killed. The rest of the party returned immediately afterwards to Rangoon.

The next route is that which leaves the Irrawaddy at Mandalay, the present capital of Burmah Proper, and passing easterly along the valley of the Myit-nge, goes through Theebo and Theinnee to the Salween, which it crosses at Konglong, thence along the valley of the Nanting to Shunning and Talifoo. It was by this route that Colonel Browne originally intended to have proceeded on his mission to Talifoo. It is traversed by numbers of traders every year, and being further from the dreaded Kachyens, has the reputation of being safer than either of the routes north or south of it. The eastern bank of the Salween, through which this route runs, enjoyed during the existence of the Panthay kingdom an excellent reputation for order. A party of Panthays, who visited Moulmein in 1870, enlarged much on the tranquillity of this route. One of them, in speaking to me of it, threw down his wallet, and said, "There, I would leave it so in any part from Kiangma to Moungting."

Of the Sprye route, from Rangoon to Kiang Hung, no one who reads the records of the Mékong expedition can doubt that its terminal point in China is admirably selected. The obstacles offered by the character of the country are, however, very great. In his report to the Glasgow Chamber of Commerce, Mr. Findlay, who has been a great traveller in Burmah, expresses himself as decidedly adverse to it on the score of difficulties of construction. "I have seen," he says, "something of the country through which this (viz., the railway from Rangoon to Esmok) would have to pass, and can say, with full assurance, that a less promising field for railway enterprise it would be difficult to imagine.

"The line proposed would have to cross four great rivers, the

Sittang, the Salween, the Menam, and the Mékong, or Great Cambodia, and no one can say how many tributary streams. Besides this, the valleys of these rivers are separated from each other by numerous ranges of hills, which, in some places, might be more properly called mountains—frequently remarkable for their steepness—covered with jungle to their summits, and utterly uninhabited, or, if at all, most sparingly so.

"I have no hesitation in saying, from what I have heard and seen of the country in question, that the scheme is in every point of view impracticable, even if the valleys were much more thickly inhabited than they are. I would further observe, that if a railway ever enters China from Burmah or Bengal, it will be by following, as far as possible, one of the valleys of the great rivers, and that it is in vain to think of doing so by repudiating the facilities offered by these, and attempting to drive a railway across them in spite of every natural difficulty and obstacle."

I should pass over the Sittang altogether as a trade outlet, were it not for the measures now in contemplation by the Local Government to draw off the very considerable trade of Tongoo, on the north-east frontier of British Burmah, by a canal and railway to Rangoon. The river itself can never be utilised for our purpose, since, owing to the peculiar formation of the head of the Gulf of Martaban, it is subject to a tidal bore which renders the Sittang unapproachable from the sea. The tidal creek, moreover, which connects the Pegu River with the Sittang being open only at spring tide, the Shan trader at Tongoo, only 160 miles from Rangoon, finds himself as distant from his market as the Chinaman at Bhamó, which is 700 miles from Rangoon.

I come next to Moulmein on the Salween (or, as it is called in China, the Loo-kiang). This river, as you will see by the map, runs precisely in the direction of the traffic we are desirous of attracting. If the river were navigable throughout, or if its deficiencies could be supplemented by canals, or if a railway could be run along its banks, the question of the best route from Tali to the sea would soon be decided. It is unfortunately navigable only for about 120 miles from the port of Amherst, where the navigation is interrupted by the falls of the Kyodan, the height of which is about 30 feet in the cold weather, the river rising to this level in the rains. Beyond this point but little of this river is known to Europeans. It is marked in the maps as full of rocks and rapids, but these obstacles have been put in mostly from hearsay and by conjecture, since, notwithstanding the despatch of several parties with a view to its exploration, the upper part of the Salween has not been visited by

any one competent to survey it. I have been assured by the natives from the neighbourhood of Moné, that it is navigable many days' journey between that town and Dahgwinzeik. The routes of the exploration parties of O'Riley, 1855–6; Barker, 1856–7; Watson, Sconce, and O'Riley, 1863–4; and Watson and Fedden, 1864–5, will be found on the map annexed to the papers relating to M'Leod and Richardson's famous missions, which I shall notice directly.

The notice by the Local Government in its Report of the trade-route leading from the Siamese Provinces on the Upper Cambodia through the tributary State of Zimmay, to the Tenasserim division of British Burmah, runs thus:—"Even from the lower provinces of China, produce finds its way by this route, and it is hoped that the commercial treaty lately entered into between the King of Siam and the Government of India, to develop and regulate the trade passing through Zimmay, may be attended with good results."

I have spoken already of the well-established trade, which it is a matter of history was formerly carried on between China and the ports of Burmah. In the first years of our occupation of the eastern part of what is now British Burmah, it seemed as if all we are now hoping for was actually made to our hands. Caravans of Chinese traders were at Zimmay, waiting only for an assurance of safe-conduct to visit our newly-acquired port. On our part, the authorities at Moulmein were using every exertion to procure, by diplomatic negotiations with Siam, the quiet of the district through which the traders had to pass.

A writer in the 'Moulmein Advertiser' says:—"We believe that one of the objects of the mission is to remove the obstacles which appear still to exist to the free passage of the Chinese overland caravans to Moulmein. This is indeed a most important object, and one that should not be lost sight of. The failure of the attempt to reach Moulmein last year must have tended greatly to discourage all future endeavours, and if, as is supposed, there exists a jealousy of this intercourse on the part of the neighbouring Shan States, it can only be overcome by the presence of a British officer furnished with a royal order for a free and unmolested passage to the Chinese. We can scarcely expect, after what has happened, to see the Chinese down this season, but we trust all impediments will be removed from future journeys."

After stating that Dr. Richardson had been selected for the mission, the writer proceeds:—

"Dr. Richardson is so well known among the Shan States that we feel convinced, should he succeed in reaching them direct from the capital of Siam, furnished with orders for the

removal of all impediments to the journey of the Chinese, we shall have them here at the close of the next year in considerable numbers, and it may be eventually that Moulmein will become an emporium for the export of tea. Captain M'Leod found it extensively cultivated between Kiang-Tung and Kiang Hung, whence it is carried into the Chinese Provinces . . ."

In the interesting 'Papers relating to the route of Captain W. C. M'Leod from Moulmein to the frontiers of China, and the route of Dr. Richardson on his fourth Mission to the Shan Provinces of Burmah,' printed by order of the House of Commons, in 1869, we find records of journeys by the officers of British Burmah, which, neither for extent nor importance of results, have been since ever equalled.

"I found," says Dr. Richardson, describing what he saw at Zimmay, in 1829, "the caravan of Chinese traders consisting of 200 mules and horses. Three hundred more were said to be at Moung-Nan, where cotton is abundant. They had arrived in the country a considerable time before me, and were preparing shortly to return home. I had a good deal of conversation with two heads of caravans, who seemed to be intelligent, enterprising characters. They said they had long entertained the idea of visiting Moulmein, and now that they were invited to do so, and were assured of protection, they would undoubtedly do so next season, the present one being too far advanced to allow of their increasing their distance from home. They requested that an interpreter should meet them at Zimmay; and from their repeated requests that he should be at Zimmay in November, in order to accompany them down, I feel convinced that this people will be at Moulmein before the end of the year."

The disposition of the chiefs through whose territory the caravans would have to pass, Dr. Richardson speaks of as most favourable. "I found," he says, "no difficulty whatever in obtaining their consent to their passing through the country. No objection was ever hinted, nor have I reason to expect that any will hereafter arise."

As to the conditions under which, if we are successful, our first trade in this direction will probably be carried on, the remarks made by Richardson on the caravans he fell in with on this occasion have much interest for us.

"The imports by these caravans consist of copper and iron vessels, silk (raw and manufactured), stains, gold and silver thread and lace, musk, walnuts, carpets, and vermilion. They export from the Shan country, cotton, ivory, skins, and horns. From the information which I could collect, the caravans assembled at Moung Koo, distant from Zimmay about two

months' journey. Their goods are conveyed by mules, and they would appear to travel rapidly, as they asserted they would not be more than twelve days from Zimmay to Moulmein. They allow nothing to detain them on their journeys. If a man fall sick, or is disabled, he is left behind; and if one dies, they do not even stop to bury him, but cover his body with a cloth, and continue their route."

The most important of these official journeys, however, so far as our present purpose is concerned, was that of Captain M'Leod, who, crossing the Thong-yeen in December, 1836, actually reached the frontier of China at Kiang Hung, on the western banks of the Mékong. Beyond this point all attempts to progress were unavailing. He was told, if he insisted upon going on, the subject must be referred to the King through the customary channels, and an answer might be expected in about a year. Though within five marches of China, Captain M'Leod, knowing he would apply to the Court of Pekin in vain, determined on returning to Moulmein, and left Kiang Hung on the 21st March. His return was far more expeditiously performed than his journey outwards. He reached Kiang-tung on the 31st, and found that orders had arrived from Moné, not to permit him to proceed until instructions had arrived from Ava. Quitting Kiang-tung on the 4th April, he arrived at Zimmay on the 19th. The authorities at Zimmay ultimately refused to permit our merchants to proceed by the road travelled by Captain M'Leod; for such was their hatred of the Burmese that they would hold no communication with them. The Chinese even, who were on terms of amity with both nations, found themselves compelled to travel on the eastern bank of the Mékong, over high mountains, where the territories of Kiang Hung adjoined those of Moung-Nan, one of the Shan States tributary to Siam.

From Zimmay, which he left on May 11th, M'Leod deviated from his former route, travelling seven days in a southerly direction, which brought him to within two stages of the town of Labong, where he crossed the Mépiu, and, striking off to the westward, reached the Thong-yeen in five days, and Moulmein by six further stages. The road he took, though circuitous, ran generally over low hills, and was in every way preferable to the route by which he had gone up, villages from which supplies were procurable being met with every second or third day. M'Leod describes the tribes, from the north of Zimmay to the frontier of China, as differing in their stages of civilization and in language, having no written character, no ideas of a Supreme Being. The mountains he saw were all thickly wooded, and abounded with wild animals and game of every sort.

The extent of the trade that now actually exists between the seaports of British Burmah and the interior will, I think, surprise those who are not acquainted with the subject by personal inspection. I was assured by Aga Syud, one of the leading native merchants of Moulmein, that the value of the piece-goods, with which our hardy visitors, the Shan pedlars, trudge back to their homes yearly, is not less than a lac (10,000*l.*), while respectable Suratee merchants had assured me that it rarely falls below 30,000*l.*, or two-thirds our entire imports of this class. The amount varies, no doubt, within large limits. Under favourable conditions, that is to say, when tranquillity prevails upon our frontiers, it attains considerable dimensions, while disturbances have an equally powerful effect in the opposite direction.

It is extremely difficult to obtain anything like trustworthy statistics with reference to the primitive trade thus carried on, the traders being apprehensive that if their profits were known to the Government, they would be subjected to taxation. The number of Shan residents, both in Rangoon and Moulmein, is very large, augmenting and decreasing in proportion to the tranquillity of the times. The numbers stood for Moulmein as high as 4859 in 1865. Owing to the troubled state of the adjacent territory of Karennee, it fell shortly after to 966.

Thinking it might be of interest, I have brought with me some silk and copper, which were brought into Moulmein, some four years ago, by a party of twenty-eight men, who had journeyed thither for a period of ninety days. I sent some of the silk to Calcutta, and mentioned the price at which it had been sold in the Moulmein bazaar. The quality was unknown in the Calcutta market, but the price was said to be very low. I may mention as giving some key to the question of price, that the piece of copper before you, which is I believe of greater intrinsic value, was the exchange among these primitive people for an anna (1½*d.*). The hardy habits of the party of traders I am speaking of, were such as, even in a country where great simplicity of life prevails, to excite surprise. They slept during their stay with us in the open air, their large, pear-shaped baskets stacked round in a circle, after the style in which, as they informed us, they bivouacked nightly during their long wanderings. One of the officers of the British India Steamers, who accompanied me to visit them, said he felt confident from their general appearance that they were natives of Tonquin, and this opinion was subsequently confirmed to me at home by Mr. Cooper, who said he was familiar with the kind of silk they brought. As I was known to take much interest in such matters, the arrival of Shan traders that had come from extraor-

dinary distances was usually announced to me by the Burmese; when possible I paid the people a visit, and endeavoured to get what information I could from them as to their routes. On the occasion of the traders I am speaking of coming in, I was called to see "Chopstick Shans," and found that half of them disposed of their food in this fashion, and the other in the manner usual with Burmese. On inquiry, it turned out that the little company was composed of two parties, who had come from different quarters, and met at about a month's march distant from Moulmein. Their routes are shown on a map made by themselves, which I have brought with me this evening.

Speaking of this and other similar maps, I am reminded of a peculiarity of the Shans which has not, I think, hitherto received attention. It is their almost instinctive recognition of time, direction, and distance—the result, no doubt, of a wandering life. The maps exhibited, and which I have much pleasure in presenting to this Society, have almost all been drawn by these pedlars themselves, usually in the verandah of my own house, the only assistance they received being that of the interpreters and lookers-on of their own parties. Those on tracing-cloth are copies kindly made for me by the Surveyor-General of India, Colonel Thuillier, in return for the originals, which, together with a set of valuable and elaborate maps which Mr. MacCall, of Todd Findlay's, was good enough to give me soon after my arrival in Moulmein, I had presented to the Government of India.

As an instance of the great distance traversed by Shan traders, I may mention the party of 54 men who were visiting Moulmein at the time that the late Viceroy, Lord Mayo, was making his tour of inspection in 1872. His Lordship spent nearly an hour before embarking in examining these men, who proved to be Panthays, who, starting from Maingshai in China, had reached Moulmein after a journey of 100 days, by way of Thein-nee, Tongoo, and Martaban. They had traded in silk and gold-thread to Thein-nee, where they bought 100 horses, which they brought on to Moulmein for sale. They had, according to their account, passed through towns of considerable size. One great step will have been taken for the security of the traders, and the accommodation of the trade by this route, when we have bridged the Attaran. The scheme has often been contemplated; and the bridge proposed, as you may see from the accompanying map, is of very modest dimensions.

The next route in order, as we move eastward, is that of the Menam. This river is exceedingly difficult of navigation; and Bangkok, the capital of Siam, its port, has not water enough to satisfy the conditions of a great oversea trade. I shall not stay, therefore, to consider the prospects of this route, but content

myself with recording the fact that on the 4th January, 1873, a treaty was concluded between the Government of Siam and the Government of India for the protection of life and property within the State of the Chief of Zimmay, through which the traffic of Moulmein from China has to pass. The treaty provides for the repression and punishment of robbers and marauders.

The route next in order eastward—a very promising one, if we judge of it by the map—is that of the Lan San Kiang, or Mékong. The merits of this route were recently tested by an expedition, the most memorable and instructive in the annals of exploration. The exploring party, headed by De Lagrée, the commander of a French gunboat, left Saigon in June, 1866, and after a visit to Pnom-peng, the new capital of Cambodia, began their arduous journey towards China. On the second day after leaving Pnom-peng the navigation became impracticable for the gunboat, and the party had to proceed in canoes. Had the object of this expedition been only to test the navigability of the river, it might have ended its labours here, for the river was full of rocks, dangerous even for canoes. They persevered, however, with the greatest gallantry. Days and weeks went by, and they continued their slow and perilous passage. Provisions began to fail. Several of the party were ill. The guards became mutinous, and, in addition to all this, the floods, against which they had to struggle, were at times so violent that the boatmen found no other means of progress possible except that of clinging to the bank and pulling themselves along by the trees and bushes. "Our hold on the bank once lost," says De Carné, "the boat would be swept away by the current like a straw."

The observations of the writer of the interesting narrative of this exploration are so valuable with reference to the very points we are desirous of determining, that I regret to be unable to give even the shortest summary of them. They include careful notes of the degrees by which the language, character, and political proclivities varied as they went on, until at Ham-gu they arrive at veritable China, find well-constructed bridges, and see women with crumpled toes. Before they reached that spot they had terrible sufferings to encounter, and at times must have almost despaired of their undertaking. At Bassak M. de Carné compares the relations of the potentate of that district with Bangkok to those of the Shan States of Burmah with Mandalay, and comes to the conclusion that the real politics of "the King," as he is called, is to profess allegiance to Siam, and do exactly as he pleases; a description which would suit, more or less accurately, a vast number out of the innumerable tribes

scattered over this unknown country. The work is written with patriotic fervour, and records the dismay that came over the party when, wearied with a long day's work, they heard near Vien-Chan that before them was another exploring party, and that an English one. The next report announces the party as coming down the river, and the wearied Frenchmen prepare a hospitable welcome. When the "English flotilla" heaves in sight, they find that their laurels are in no danger. It turns out to be the equipage of a Batavo-Dutchman, land-surveyor and architect to his Majesty the King of Siam. Above Paklay, in 18° N. lat., the party passed over the boundary of old Dutch explorations, and found themselves literally in *terra incognita*. The river at this spot, M. de Carné says, takes a bend for nearly 200 miles due west, a direction altogether contrary to that represented on the best maps. At Luang Prabang they discharged the pious office of erecting a monument over the remains of the famous and much lamented traveller Henri Mouhot.

Shortly after leaving Luang Prabang the party had an opportunity of settling a point on which geographers had disagreed. The Menam and the Mékong, namely, were known to approach each other very closely in this region, and it was supposed that they actually coalesced. A point of observation was soon attained from which it was seen that where they were nearest they were separated by a lofty mountain-range, on which a small crater of a volcano was active. At Kiang-tung the language had undergone a change, but the Laotian interpreter was still able to perform his functions. At a later stage the party had to depend for their communication with the authorities on the written character of the country, with which these Annamite attendants were familiar. This mention of written character reminds me of a circumstance that occurred when, in 1870, a party of Panthays were paying a visit to us at Moulmein. Being asked to write their names, some of them wrote them in Chinese and some in Burmese characters, using the latter not for the same sounds as they represent in Burmah—in fact, with so little resemblance to them as to induce me to believe that they had adopted them arbitrarily. Besides language and physical conformation, there were other than outward signs by which the party were able to gauge the extent of Burmese influence in these regions. At Luang Prabang the travellers noticed the prevalence of the Burmese habit of tattooing from the waist downwards—a practice which procured for the inhabitants of this province from the old Dutch geographers the title of "black-bellied Laos."

At Paleo M. de Lagrée was "invited" by a letter from the Tsaubwa to continue his journey through Kiang-tung. Neglect-

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ing this invitation, which was intended as a command, M. de Lagrée passed on to Siemlâp, in the State of Muang-Yu, and here difficulties thickened on him. The rains were at their height, and carriage transport was not to be had except at most inordinate rates. The party, however, gallantly struggled on, though each member of it was weakened by fever, dizzy with copious doses of quinine, and faint by the constant bleeding by the leeches, which form so terrible a scourge in Indo-China. Shoeless and ragged, the party arrived at last, across muddy plains and raging torrents, at Siemlâp.

At Muang-yong M. de Lagrée experienced the consequences of having refused the "invitation" of the Tsaubwa of Kiang-tung. The governor of Muang-yong declared it impossible that persons guilty of such ill-breeding could be allowed to pass, and M. de Lagrée had to retrace his steps to Kiang-tung, leaving his party at Muang-yong. His reception by the Tsaubwa was polite and courteous. No further obstacles were interposed to the continuance of his journey, and the whole party re-assembled at Muang-yong. Here they were provided with boats, in which they continued their journey down the Namloi. Crossing a range of hills into the valley of the Nam-ga, they then came next to the town of Muang-long, in the Kiang Hung State. The party were congratulating themselves on their improved prospects, when a letter arrived from Kiang Hung with orders that, if the Europeans arrived, they were to return at once by the way they had come. For this unexpected and apparently arbitrary interruption to their progress it turned out that they were indebted to an excess of zeal for their safety on the part of their own countryman, the Vicar Apostolic of Yunnan. Thinking it highly dangerous for them to prosecute their journey, that functionary had addressed a letter to the Viceroy of Yunnan, and induced that official to send a similar letter to Kiang Hung, and this had been construed by the latter as a prohibition to the party to enter China. The mistake having been explained, the Mékong was crossed for the last time 1200 miles from its mouth; and the precipitous hills which separate the plains of Yunnan from the river having been surmounted, the party found themselves, on the 13th of October, 1867, sixteen months after they had left Saigon, in sight of the long-looked-for Esmok in Yunnan. The suburbs were in ruins, the result of the civil war then raging. From the accounts which he received here of the state of Upper Yunnan, M. de Lagrée judged further advance in the basin of the Mékong (here called the Kiu-lung Kiang, or "River of the Nine Dragons") impracticable. The condition of his party was now almost desperate. Their exchequer was all but empty. They were shoeless and in rags, and the health

of all seriously impaired by the privations they had undergone. They had no interpreter, and had to communicate with the authorities through their Annamite attendants, who still understood the written characters though not the language of the country. On leaving the basin of the Mékong the expedition directed its steps towards the Sonkoi, which it struck at the town of Yueng-kiang. Here better days awaited them. Through Southern Yunnan the passport of Prince Kung insured for them everywhere a hospitable reception, and guards and carriage were placed without payment at their disposal. The country is described as fully meriting all the eulogies it has received, and the weary wayfarers declared the scenery reminded them of Provence. The cultivation was everywhere admirable: while pine-forests, and mines of salt, coal, iron, and other metals, gave everywhere tokens of national wealth.

For upwards of a month M. de Lagrée traversed the southern portion of Yunnan, visiting the large cities on his way to the provincial capital, Yunnan-Sen. The officials everywhere received the party courteously, and the worst they had to suffer was from the intense and inconvenient curiosity of the populace as to the habits and customs of the "foreign devils," who were now for the first time seen in Yunnan in their national costume. At Yunnan-Sen the party was sumptuously lodged and entertained, and here they had the pleasure of meeting with their own countrymen in the persons of French Jesuit Missionaries of Yunnan. The Governor violently opposed M. de Lagrée's project of visiting Talifoo before embarking on the Yangtse for Shanghai. He could not believe that any one could wish to visit the head-quarters of rebellion without being in league with the rebels. The address of M. de Lagrée triumphed at last over this opposition, and, furnished with a letter from the Grand Mufti of Yunnan-Sen to the Sultan of Talifoo, the party started once more on their adventurous journey. The route it was thought best to adopt was a somewhat circuitous one through the southern part of Sze-chuen. They would thus approach Talifoo through a tract which, by the common consent of the rebels and Imperialists, had been left neutral ground, in order that the commerce of the Yangtze-kiang should not be interrupted. The party at length reached the valley of the Yangtze, where they were hospitably received at Tong-chuen. Here M. de Lagrée became so ill as to be unable to proceed. Leaving one of the doctors with him, the rest of the officers, viz. Messrs. Garnier, Delaporte, Thorel, and De Carné, started on the 30th January, 1868, for Talifoo. Their way was through Hweli, from which town they advanced boldly into the rebel States under the guidance of a Chinese Catholic priest, Père Lu, who

conversed with them in Latin, but a Latin, as De Carné cannot help saying (*à faire frémir*), "enough to make your flesh creep." The bands of robbers against whom they had been warned were not to be seen. At every place where Mussulman authority prevailed the letter of the Grand Mufti of Yunnan-Sen procured them a cordial reception. At Pien-ho, their progress was further assisted by another Chinese Catholic priest, whose Latin is declared to have been "absolutely unintelligible." In the same neighbourhood, however, they found a third (a French) Catholic priest who was most useful to them. Father Leguilcher had been living in complete retirement, concealing his whereabouts as much as possible from the Mussulman authorities, whom he described as sanguinary and cruel tyrants, who, during the last ten years, had reduced the population of Yunnan by one-half. At the sight of his countrymen he courageously resolved to emerge from his retreat and accompany them to Tali as their interpreter. The party had now to lament the absence of their politic leader, whose admirable tact and *savoir faire* had carried them safely through so many perils. An unfortunate fracas in the streets of Talifoo brought their stay to an end. They had to retrace their steps to Hweli-chouen without exploring the city or the magnificent valley on which it is situated. To the French, therefore, belong the honours of having been the first to reach the goal we have all along been aiming at.

The expedition returning to Tong-chuen found that their gallant leader had succumbed to a disorder produced by the toils and exposure he had undergone in the course of his long and painful journey, and the party descending the Yangtze-kiang, arrived with his remains, after an absence of two years, at Saigon.

The merits of the Sonkoi, which forms the next route, had, as we have seen, attracted the attention of De Lagrée on his journey of exploration of the Mékong, and it is to this river that the French have since the date of that exploration been chiefly directing their attention. M. de Carné speaks of the capabilities of this river-route in the highest terms. The Civil war in Yunnan, he says, "has in effect obstructed the ancient channel through which the products of Yunnan flowed into the valley of the Irrawaddy, and opposes new obstacles to the re-opening of that road between China and India which is being sought for by the English with more obstinacy than good fortune. When one reflects that what is now required is to direct towards a French possession the products of that vast region, which, without including northern Laos, embraces four of the richest provinces of China, and to open out to us markets where the consumers are counted by millions, it must be admitted that a

war of conquest and the opening of Tonquin is a necessary result of our establishing ourselves in the six provinces of Lower Cochin China."

The remarks of M. de Carné are endorsed in a very admirable article contributed by another traveller, Herr von Richthofen, to 'The Geographical Magazine' of January, 1874. In an admirably concise and lucid *résumé* of the whole question of trade-routes into South-Western China, that gentleman decides unhesitatingly in favour of the Sonkoi, with Mang-hau as the depôt on its head-waters.

On the 25th of October, 1872, the expedition of the Sonkoi started from Hong Kong under the command of M. Dupuis, a merchant of Hankow, and M. Millot, a merchant of Shanghai. It consisted of two French gunboats and a steam launch, freighted by the Titai Mah of Yunnan with the materials of war. The expedition arrived off the mouth of the Sonkoi on the 9th of November, and moved up the river to Kecho or Hannoi, the capital of Tonquin, where it arrived on the 22nd of December, 1872. Tonquin was found to be in a state of political confusion, for the settlement of which M. Dupuis' good offices were put in requisition, and peace eventually restored. M. Dupuis left Hannoi on the 18th of January, and reached Lao Kai, the last city in Tonquin, on the 20th of February. The Hong Kong papers, which reported the progress of the expedition, state that during the whole time the expedition was in Tonquin the Europeans experienced the best reception from the population, "who have the greatest desire to see the foreigners arrive to open their country and relieve them from the oppression" of the mandarins, who are regarded "with the bitterest contempt, and the deepest hatred."

Eastward again of all these routes is that by the valley of the Sikiang, with its seaport of Canton. This, as a saving of time or avoidance of perilous navigation, we need hardly consider.

With Shanghai we close the list of the ports of South-Eastern Asia in any way suited for the reception of the produce of South-Western China. From this busy centre of commerce the attempts have not been few to ascend the Yang-tze in its upper branches, and add to our knowledge of the country in that direction. I have time only to speak of two. Of him that has done the most, who has actually performed the feat, while others were nerving themselves for the attempt or recovering from the discouragement of failure, I say the least. Mr. Margary, attended only by his servants, left Shanghai last September and reached Bhamó in January of the present year. I will not attempt the panegyric or the lament of this accomplished traveller, in whom tenacity of purpose seems to have

been so happily blended with affability of manners as to conciliate a notoriously suspicious and jealous population, and render his journey (with exceptions that only gave the zest of variety to his enjoyment—to use his own words)—a "triumphal progress." I have read in the papers many eloquent tributes to the memory of Mr. Margary; but I hardly know whether any have impressed me as conveying the sentiment we should entertain on such an occasion as forcibly as the simple remark of the Secretary of this Society, Mr. Major, when I informed him of the sad occurrence, "He has left us a noble legacy in his example."

The last traveller I shall mention is the gentleman whose exertions at the opposite point of the compass first engaged our attention, Mr. T. T. Cooper. Leaving Shanghai in 1868, Mr. Cooper on arriving at Ching-tu, the capital of Sze-chuen, assumed the native dress for the purpose of avoiding observation, and struck into the only route now in use out of the three formerly travelled from China into Mongolia, terminating at Lhassa, the capital of Tibet. His course was by way of Ta-tsian-loo and Batang Atensee and Weeseefoo. At the latter place he was imprisoned, and on his release returned to Shanghai, whence he started for Calcutta on his tour I have already described.

While at Ta-tsian-loo, Mr. Cooper, writing to the editor of the 'North China Daily News,' thus expressed himself as to the project in which Bhamó is considered the natural outlet for trade from the districts of the Upper Yang-tze. "The present trade," he observes, "between Chunking and Yunnan and Kweichau is only temporary on account of the closure of the Bhamó and Tali route, and as sure as this route is opened so surely will Burmah take to herself the trade of these two provinces; and if, as is probable, British merchants establish themselves at Ava, a rivalship for the trade of Sze-chuen between China and Burmah seems almost certain, the result telling probably in favour of the latter both in exports and imports. Trade by this route has flourished before without European enterprise, and as soon as it is re-opened the trade between Hankow and Chunking will be lessened one-third."

One can hardly conclude the subject without noticing, in a few words, the grandest of all the schemes for a direct route, viz., railroads such as Sir Macdonald Stephenson and others have proposed, either directly across Yunnan by Talifoo, or following the route proposed to himself by Captain Blakiston in his gallant attempt to reach Tibet in 1860, viz., by leaving the Yang-tze at the point at which it ceases to be navigable, and taking a course as nearly west as the nature of the country would

admit of, by Likiang in Northern Yunnan to Sudiya on the Brahmaputra. The missionaries report a very superior coal-formation as covering in little disturbed positions the northern half of Yunnan, and spreading probably through the extent of the plateau of that province to its southern descent on the Sonkoi, on which M. Dupuis has reported the discovery of coal.

I have now stated, to the best of my ability, the nature of the various routes, the incidents connected with their exploration, and the various opinions entertained of their merits. I shall be happy if the observations I have made have simplified the subject for those who are interested in geographical inquiry, and happier still, if they should be the means of inducing men of influence to visit Burmah. If any should find themselves so disposed, I would recommend them to visit the provinces in November and keep a watch on the Attaran. It will need only a morning's drive from Moulmein town to bring them face to face at the ferry of Nyoung-ben-zeik with troops of hardy Shan pedlars by whom Kong-long, Shunning, Kiengma, Moungting, and Tali, have in all probability been visited within the year. Seeing them, it is difficult not to look forward hopefully to the time when the petty rill of commerce now filtering through every obstacle that a disorganised and lawless country can present, will by the restoration of order swell into a broad stream of international trade.

As will be readily understood, the task of compressing within the limits of a short paper a subject so widespreading as trade-routes from Western China has been no easy one, and I would ask indulgence on this ground for the necessary incompleteness of the paper I have written on it.

IX.—*Journal of the Western Australian Exploring Expedition through the Centre of Australia, from Champion Bay to the Overland Telegraph Line between Adelaide and Port Darwin.* By John Forrest, F.R.G.S.*

[*Read*, April 12th and June 28th, 1875.]

Before commencing my Report I will give a brief account of the reasons that induced the Government of Western Australia to undertake this Expedition; and with that view I insert the

* This narrative is the same as that of Mr. Forrest's Report to the Hon. Malcolm Fraser, Commissioner of Crown Lands, with the exception of some alterations and omissions made by Mr. Forrest himself, in order to adapt it for the 'Journal.'

following letter, addressed by me for the information of His Excellency Governor Weld, together with His Excellency's minute on my proposition.

"SIR, "Western Australia, Perth, July 12th, 1872.

"I have the honour to lay before you, for the consideration of His Excellency the Governor, a project I have in view for the further exploration of Western Australia.

"My wish is to undertake an Expedition, to start early next year from Champion Bay, follow the Murchison to its source, and then continue in an east and E.N.E. direction to the Telegraph Line, now nearly completed between Adelaide and Port Darwin; after this we would either proceed north to Port Darwin or south to Adelaide.

"The party would consist of four white and two black men, with twenty horses; well armed and provisioned for at least six months. The total cost of the Expedition would be about 600*l*., of which sum I hope to be able to raise by subscriptions about 200*l*. The horses will be furnished by the settlers, many having already been promised me.

"The geographical results of such an Expedition would, necessarily, be very great; it would be the finishing stroke of Australian discovery; would be sure to open up new pastoral country; and, if we are to place any weight in the opinions of geographers (among whom I may mention the Rev. Tenison Woods), the existence of a large river running inland from the watershed of the Murchison is nearly certain.

"Referring to the map of Australia you will observe that the proposed route is a very gigantic, hazardous, and long one; but, after careful consideration, I have every confidence that, should I be allowed to undertake it, there are reasonable hopes of my being able to succeed.

"Minor details are purposely omitted; but should His Excellency favourably entertain this proposition, I will be too glad, as far as I am able, to give further information on the subject.

"Trusting you will be able to concur in the foregoing suggestions,

"I have, &c.,

"JOHN FORREST.

"*To the* HON. MALCOLM FRASER,
Commissioner of Crown Lands."

Memorandum of His Excellency the Governor.

"July 20th, 1872.

"Mr. J. Forrest, in a most public spirited manner, proposes to embark in an undertaking, the dangers of which, though not by any means inconsiderable, would be outweighed by the advantages which might accrue to this colony, and which would certainly result in a great extension of our geographical knowledge; should he succeed in this journey, his name will fitly go down to posterity as that of the man who solved the last remaining problem in the Australian continent; and, whatever may come after him, he will have been the last (and certainly, when the means at his disposal and the difficulties of the undertaking are considered, by no means the least) of the great Australian explorers.

"The honour to be gained by him, and most of the advantages, will ultimately fall to this colony, which is his birthplace; and, for my own part, I shall be very proud that such a design should be carried out during my term of office. I wish that the means of the colony were sufficient to warrant the Government in proposing to defray the entire cost of the Expedition, and I

think it would be a disgrace to the colony if it did not at least afford some aid from public funds.

"These papers will be laid before the Legislature, and the Government will support a vote in aid should the Legislature concur.

"FRED. A. WELD."

The subject was brought before the Legislative Council by His Excellency, and resulted in a sum of 400*l.* being voted towards the Expedition.

Soon after this, three Expeditions from South Australia left the Telegraph Line, with nearly the same object in view; and, as they were first in the field, it was decided to postpone our Expedition till March, 1874, in order, as His Excellency Governor Weld wisely said, that we should not be running a race with the South Australians, but rather wait and benefit by their discoveries.

Only one of the three Expeditions, viz., that commanded by Major Warburton, succeeded in reaching the West Coast, but so far to the north as not in any way to interfere with our intended exploration. I therefore lost no time in equipping an Expedition, and, before leaving Perth, received the following outline of instructions for my general guidance:—

"Western Australia, Surveyor-General's Office,
"Perth, 17th March, 1874.

"SIR,

"The arrangements connected with the party organized for the purpose of proceeding on an exploratory Expedition to the north-eastern division of this territory having now been completed, I am directed to instruct and advise you generally in the objects and the intention of the Government in regard to it.

"The chief object of the Expedition is to obtain information concerning the immense tract of country from which flow the Murchison, Gascoigne, Ashburton, De Grey, Fitzroy, and other rivers falling into the sea on the western and northern shores of this territory, as there are many good and reasonable grounds for a belief that those rivers outflow from districts neither barren nor badly watered.

"Mr. A. C. Gregory, coming from the northwards by Sturt's Creek, discovered the Denison Plains; and it may be that from the head of the Murchison River, going northwards, there are to be found, near the heads of the rivers above alluded to, many such grassy oases; and, looking at the success which has already attended the stocking of the country to the eastward of Champion Bay, and between the heads of the Greenough River and Murchison, it will be most fortunate for our sheep-farmers if you discover any considerable addition to the present known pasture-grounds of the colony; and by this means, no doubt, the mineral resources of the interior will be brought eventually to light. Every opinion of value that has been given on the subject tells one that the head of the Murchison lies in a district which may prove another land of Ophir.

"In tracing up this river from Mount Gould to its source, and in tracing other rivers to and from their head-waters, detours must be made; but, generally, your course will be north-east until you are within the Tropics; it will then be discretionary with you to decide on your route, of which there is certainly a choice of three, besides the retracing of your steps for the purpose,

perhaps, of making a further inspection of the good country you may have found.

"Firstly. There is to choose whether you will go westward, and fall back on the settlements at Nicol Bay or the De Grey River, on the North-west Coast.

"Secondly. To consider whether you might advantageously push up Sturt's Creek, keeping to the westward of Gregory's Track.

"Thirdly. To decide whether or not you will go eastward to the South Australian Telegraph Line.

"Possibly this latter course may be the most desirable and most feasible to accomplish, as the telegraph stations, taking either Watson's Creek or Daly Waters, are not more than 300 miles from the known water supply on Sturt's Creek; and, supposing you do this successfully, the remaining distance down the Telegraph Line to Port Darwin is a mere bagatelle, provided an arrangement can be made with the South Australian Government to have a supply of provisions at Daly Waters.

"In the event of your going to Port Darwin, the plan probably will be to sell your equipment and horses, returning with your party by sea; but in this and in other matters of detail there is no desire to fetter you, or to prevent the proper use of your judgment, as I am fully aware that your sole object is in common with that of the Government—the carrying to a satisfactory result the work to be done.

"I hope that, before you individually leave, we shall have the pleasure of welcoming Colonel Warburton, and I have no doubt will be able to obtain some valuable information from him.

"Having now dwelt generally on the objects of the Expedition, I will go more into details.

"Your party will consist of yourself as leader, Mr. Alexander Forrest as Surveyor and second in command, James Sweeney (farrier), police constable James Kennedy, and two natives, Tommy Windich and Tommy Pierre, making six in number, and twenty horses. The party will be well armed; but by every means in your power you will endeavour to cultivate and keep on friendly relations with all the aborigines you may fall in with, and avoid, if possible, any collision with them.

"The provisions and other supplies already arranged for are calculated to serve the party for eight months. The Expedition will start from Champion Bay, to which you will at once despatch by sea the stores to be obtained here; and the men and horses should proceed overland without delay. You will be probably able to charter carts or drays to take most of your impedimenta from Geraldton to Mr. Burges's furthest out-station on the Murchison; this will save you 200 miles of packing, and husband the strength of your horses for that distance.

"Having the assistance of Mr. Alexander Forrest as Surveyor to the party, you will do as much reconnaissance work in connection with the Colonial Survey as it may be possible; and also, by taking celestial observations at all convenient times, and by sketching the natural features of the country you pass over, add much to our geographical knowledge. All geological and natural history specimens you can collect and preserve will be most valuable in perfecting information concerning the physical formation of the interior.

"You will be good enough to get the agreement forwarded with this signed by the whole of the party.

"I am, &c.,
"MALCOLM FRASER,
"Surveyor-General."

The members of the Expedition left Perth on the 18th March (after being wished God-speed and every success by the Acting

Governor, Colonel Harvest), and reached Champion Bay on the 28th, from which place we intended making a final start on 1st April. On the 29th, 30th, and 31st, we were busy preparing our stores, shoeing horses, and starting a team with heaviest of our baggage to a spot about 150 miles inland.

April 1st.—We made a start at about 12 o'clock; and, after a great deal of trouble, horses running away and kicking and jumping, got fairly on the road, and reached Knockbrack, the residence of Mr. Thomas Burges, where we remained on the 2nd, and the next day, which was Good Friday. On the 18*th*, we left a place called Poondarrie, having eighteen packhorses, and three riding, and on the 22*nd*, camped at a granite hill called Bia, with a fine spring on its north side. Got a view of Mount Murchison, which bore N. 7° E. (mag.) from camp.

On the 24*th*, we reached the Murchison River, and followed along up it. Fine grassy flats, good loamy soil, with white-gums in the bed and on the flats. Travelled about 14 miles, and camped. Rather brackish water in the pools. Shot seven ducks and eight cockatoos. Saw several kangaroos and emus.

On 25*th*, continued up river for about 9 miles, and camped at a fine spring in the bed of river of fresh water, which I named Elizabeth Spring; it is surrounded by salt water, and is quite fresh. Windich shot an emu, and some ducks were also shot. Fine grassy country along the river; whitegums in flats; large salt pools.

On 28*th* (*Tuesday*), still following up the river, fine pools for the first 6 miles, with numbers of ducks in them. After travelling about 20 miles we lost the river, keeping too far to the east, and following branches which we mistook for the main stream: in fact, the river spreads out over beautifully grassed plains for many miles. Fearing we should be without water, I pushed ahead, and, after following a flat for about 6 miles, got into the main river, where there were large pools of brackish water. Returning in all haste, as it was getting late, I could not find the party, they having struck westward. I got on the tracks after dark, and, after following them 2 miles, had to give it up and camp for the night, tying up my horse alongside of me; neither food nor water, and no rug. I anxiously awaited daylight, when I followed on the tracks and overtook the party; encamped on the main branch of the river, with abundance of brackish water in the pools. Shot several cockatoos.

May 1st.—Commenced keeping watch last night, two hours each. Following up river, keeping a little to the south of it for about 15 miles. We camped on a splendid grassy flat with a fine large pool of fresh water in it. Shot several ducks.

This is the best camp we have had; plenty of grass and water.

2nd (Saturday).—Steered straight for Mount Gould, N. 58° E. for 16 miles, when I found I had made an error, and that we had unknowingly crossed the river this morning. After examining the chart I steered south-east towards Mount Hale, and, striking the river, we followed along it a short distance, and camped at some brackish water.

3rd (Sunday).—Went to the summit of Mount Hale in company with Pierre, and after an hour's hard work reached it; it was very rough and difficult to ascend. The rocks were very magnetic. The view was very extensive. The whole country was an extended plain. To the east, plains for at least 30 miles, when broken ranges were visible. Mount Gould to the N.N.E. showed very remarkably. Mount Narryer range was visible. To the south only one hill or range could be seen, while to the south-east broken ranges of granite were seen about 30 miles distant. Mount Hale is very lofty and rugged, and is composed of micaceous iron ore with brown hematite; it is very magnetic, rendering a compass useless. Returned about 1 o'clock.

4th (Monday).—Started at 9 o'clock, and travelling northeast for 3 miles came to junction of river from Mount Gould, when we got some fresh water and also met two natives, who were friendly and accompanied us on. We took the south or main branch of river, and steering a little south of east for about 9 miles over splendidly grassed country, we camped on a small pool of fresh water on one of the courses of the river.

5th (Tuesday).—We travelled up easterly along the river, which spreads out and has several channels, sometimes running for miles separately, then joining again. There were many fine fresh pools for the first 4 miles, after which they were all salt, and the river divided into so many channels that it was difficult to know the main river. After travelling about 16 miles over fine grassy plains and flats we were joined by seven natives, who had returned with the two who had left us this morning, and who told us that there was no fresh water on the branch we were following, and we therefore followed them N. 30° E. for 7 miles (leaving the river to the southward), when they brought us to a small pool in a brook, where we camped.

6th (Wednesday).—Three of the natives accompanied us today. We travelled east for 6 miles, when I ascended a rise and could see a river to the north and south; the one to the north the natives say is fresh. As the natives say there is plenty of water ahead, N. 70° E., we continued on to a hill and

range, which I named Mount Maitland; and at about 20 miles we reached it, but found the spring to be a bad one, and after digging it out no water came in. I tied up the horses for some time before letting them go. Ascending the hill close to the camp I got a very extensive view, and a fine round of angles. The compass is useless on these hills, as they are composed of micaceous iron ore, with brown hematite, which is very magnetic. To the east a line of high remarkable ranges running to the east extended, which I have named the Robinson Range, after His Excellency Governor Robinson. The two highest parts I named Mount Fraser and Mount Padbury. The river could be traced for 30 miles by the line of whitegums, while to the south, also, long lines of whitegums could be seen. I am not sure which is the main branch, but I intend following the one to the north, as it looks the largest, and the natives say it is fresh.

The last 35 miles has been over fine grassy plains, well adapted for sheep runs; and water could, I think, be easily procured by digging, as well as in the river.

7th (*Thursday*).—The three natives ran away (or at least left us without asking leave) this morning. We had to keep watch all last night over the horses, to keep them from rambling. Got an early start, and steering N. 70° E. for about 12 miles, we reached the river, and camped at a fresh pool of splendid water. This is a fine large branch, and fresh, and I believe it is one of the largest if not the main branch. The country to-day was more undulating, and splendidly grassed, and would carry sheep well. The whole bed of the river, or at least valley, is very well adapted for pastoral purposes, and will no doubt ere long be stocked.

8th (*Friday*).—Continued up the river for about 15 miles, the river gradually getting smaller, many small creeks coming into it; wide bed and flat. Fine grassy country on each side, and some permanent pools in river. Camped at a small pool of fresh water and rode up to a low ridge to the north-east, from which I got a fine view to the eastward. I do not think the river we are following goes much further; low ranges and a few hills alone visible.

9th (*Saturday*).—Continued along river, which is gradually getting smaller, for about 13 miles over most beautiful grassy country, the best we have seen. Whitegums along bed. I believe the river does not go more than 20 miles from here; it is now very small. Found a nice pool of water and camped.

10th (*Sunday*).—Went with Windich, south, about 8 miles to a low range, which I rightly anticipated would be a watershed. Could see a long line of whitegums, which I believe is a river

to the south, and may be the salt branch of the Murchison. Returned to camp at 2 o'clock. The country is very dry indeed; in fact we could not be more unfortunate in the season, thus far. I only trust we may be blessed with abundance of rain shortly, otherwise we shall not be able to move at all.

11*th* (*Monday*).—Continued up river, which is getting very small, over beautifully grassed country, and at 7 miles came to a fine flat and splendid pool of permanent water. It is a delightful spot, but I did not halt, as we had come such a short distance. Here we met six native women, who were very frightened at first, but soon found sufficient confidence to talk, and to tell us there was plenty of water ahead; they always say this, so I do not put any faith in it. We continued on about east for 8 miles to a high flat-topped hill, when we got a view of the country ahead, and turned about north-east towards some flats, and at about 8 miles camped on a grassy plain, with some small clay pans of water. Splendid feeding country all along this valley—I may say for the last 100 miles. Heard a number of natives cooeying above our camp, but did not see them.

12*th* (*Tuesday*).—Starting E.N.E. for 4 miles, then north 3 miles to the range, where we searched for over an hour for water, without success. We then travelled south-east for 5 miles, and south 1½ mile, to a waterhole in a brook, by digging out which we got abundance of water. About a quarter of a mile further down the brook we found a large pool of water, and shot six ducks. As soon as we unloaded it commenced to rain, and kept on steadily till midnight. I am very pleased to get a little rain at last, as the country is very dry. Splendid open feeding country all to-day, and the camp is a beautifully grassed spot.

13*th* (*Wednesday*).—Continued on, steering about south-east, as the flat we have been following the last week is now nearly at an end; therefore determined to bear to the south, in order to see where the south branch of the river goes. For the first 6 miles over most magnificent grassed country. Ascended a low range to get a view of the country. The prospect ahead was not very cheering. Took round of bearings. A very conspicuous range bore about south, while to the south-east only one solitary hill could be seen, distant about 20 miles. We, however, continued on for about 10 miles over most miserable country, thickets and spinifex, when we reached some granite rocks and a low rise of granite, on which we found sufficient water to camp.

14*th* (*Thursday*).—Steered south-east for about 14 miles to a low stony range, thence E.N.E. and east and south for 6 miles,

turning and twisting, looking for water. Windich found some in a gully, and we camped. Spinifex for the first 14 miles, and miserable country. The prospect ahead not very promising.

15*th* (*Friday*).—Raining lightly this morning; I did not proceed, but gave the horses rest.

16*th* (*Saturday*).—Continued east for 5 miles, when we found three of the horses were missing; returned with Windich, and found them near camp, having never started at all. Seeing whitegums to the south-east, we followed down a fine brook with a fine grassy country on each side (which I named Negri Creek, after Commander Negri, founder of the Geographical Society of Italy), 5 miles, when it joined another and continued south-east for about 3 miles, where it lost itself in open flats. Struck south for 2 miles to some large whitegums, but found no water. After looking about a good deal, I found water in a gully and camped. Distance travelled about 20 miles. Spinifex and grassy openings the first 5 miles to-day.

17*th* (*Sunday*).—The horses rambled far away, and it was noon before they were all collected. Shifted 3½ miles north, where there was better feed and water. Went on to a low spinifex hill on the north of our last night's camp, and got a fine view of the country to the south and south-east. Two remarkable flat-topped hills bore south-east, which I named Mount Bartle and Mount Russell (after the President and Foreign Secretary of the Royal Geographical Society); and a long line of whitegums (colalyas) running east and west, about 10 miles distant, looked very much like a river. To the east and north the view was intercepted by low stony rises, apparently covered with spinifex. Large whitegum clumps studded the plains in every direction. Evidences of heavy rainfall at certain times to be seen everywhere.

18*th* (*Monday*).—Steered S.S.E. for 4 miles, then south-east generally towards the flat-topped hills seen yesterday, and which bore 144° E. (mag.) from the spinifex hill. At 6 miles crossed a low range covered with spinifex, after which we passed over country generally well grassed, and some of it most beautifully grassed, and whitegums, very large, in clumps, studded all over the plains. At about 22 miles reached the flat-topped hills, and camped, finding some water in a clay-pan. The line of whitegums I find are only large clumps studded over extensive plains of splendidly grassed country. No large watercourse was crossed, but several small creeks form here and there, and afterwards run out into the plains, finally finding their way into the Murchison. It was sundown when we camped. Walked over 20 miles myself to-day.

19*th* (*Tuesday*).—Continued in a north-easterly direction for

about 8 miles over fine grassy plains, and camped at some water in a small gully with fine feed. I camped early in order to give the backs of the horses a good washing, and to re-fit some of the pack-saddles. Passed several clay-pans with water. We have not seen any permanent water for the last 80 miles, and I much wish to find some, as it is very risky going on without the means of falling back. The country seems very deficient of permanent water, although I believe plenty could be procured by sinking.

20th (*Wednesday*).—Steering north-east for 5 miles over fine grassy plains came to a low stony range, ascending which we saw, a little to the south, a line of (colalyas) whitegums, to which we proceeded, and following up a large brook for about 5 miles north-east, we camped at a small water-hole in the brook. In the afternoon I went with Pierre about 1 mile north-east of camp to the summit of a rough range and watershed, which I believe is the easterly watershed of the Murchison River. All the creeks to the west of this range (which I named Kimberley Range) trend towards the Murchison, and finally empty into the main river. From this range we could see a long way to the eastward. The country is very level, with low ranges, but no conspicuous hills; not very promising country for water, but still looks good feeding country.

21st (*Thursday*).—Continued on north-east, and travelling over the watershed of the Murchison, we followed along a gully running north-east; and passing some waterholes we continued on and ascended a small range, from which we beheld a very extensive clear plain just before us. Thinking it was a fine grassy plain, we quickly descended, when, to our disgust, we found it was spinifex that had been burnt. We continued till 3 o'clock, with nothing but spinifex-plains in sight. I despatched Windich towards a range in the distance, and followed after as quickly as possible. When we reached the range we heard the welcoming gunshot, and continuing on we met Tommy, who had found abundance of water and feed on some granite rocks. We soon unloaded, and were all rejoiced to be in safety, as the prospect this afternoon was anything but cheering. Distance travelled about 30 miles.

23rd (*Saturday*).—Continued on north-east for about 12 miles over spinifex-plains and sandy ridges. Went on ahead with Windich, and came to a gorge and some granite rocks with abundance of water, and were soon joined by the party.

25th (*Monday*).—Continued onwards about north 40° east for 8 miles, passing a low granite range at 6 miles. Came on to a fine brook trending a little south of east, which we followed downwards 7 miles, running nearly east. This brook

was full of water, some of the pools being 8 or 10 feet deep, 10 yards wide, and 60 yards long; it flowed out into a large flat, and finally runs into a salt lake; I named this brook Sweeney Creek. Leaving the flat, we struck N.N.E. for 4 miles, and came to a salt marsh about half-a-mile wide, which we crossed and followed along and into some high ranges, which I named the Frere Ranges after Sir Bartle Frere. Found a small rock waterhole in a gully and camped. Water appears to be very scarce in these ranges. It is very remarkable that there should have been such heavy rain 12 miles back and none at all here. Rough feed for horses. Distance travelled about 27 miles. These ranges run east and west, and are the highest we have seen. The marsh appears to follow along the south side of the range.

26th (Tuesday).—Ascended the Frere Ranges and got a fine view to the north and east. Fine high hills and ranges to the north; a salt marsh and low ranges to the east and south-east. Continued on north-east for 4 miles, and then N.N.W. for 3 miles, passing plenty of water in clayholes and claypans in bed of marsh; we camped at a fine pool in a large brook that runs into the marsh, which I called Kennedy Creek (after my companion James Kennedy). The prospect ahead is very cheering, and I hope to find plenty of water and feed for the next 100 miles.

27th (Wednesday).—Followed up the Kennedy Creek, bearing N.N.E. and north for about 7 miles, passing a number of shallow pools, when we came to some splendid springs, which I named the Windich Springs (after my old and well-tried companion Tommy Windich, who has now been on three exploring expeditions with me). They are the best springs I have ever seen; flags in the bed of the river and pools 12 feet deep and 20 chains long; a splendid place for water. We therefore camped, and found another place equally good a quarter of a mile west of camp in another branch. This is a most magnificent place for water and feed, unlimited supply and permanent. A fine range of hills bore north-west from the springs, which I named Carnarvon Range; they looked very remarkable, but were covered with spinifex almost to their very summit. We shot five ducks and got three opossums this afternoon, as well as did some shoeing. There is an immense clump of white-gums at head of spring.

28th (Thursday).—Steering N. 30° E. for 11 miles we came to a rough hill, which I ascended and camped on north side of it, at a little water in a gully. The view was very extensive and not very promising. Spinifex in every direction. A bold hill bore N. 31° E. (mag.) about 7 miles distant to the N.N.W., which I named Mount Salvado (after Bishop Salvado, of

Victoria Plains). The Carnarvon ranges looked very remarkable. To the east and north-east, spinifex and low ranges for 15 miles, when the view was intercepted by spinifex rises. Altogether very unpromising.

29th (Friday).—Steered E.N.E. for 7 miles, when we came to some fine water in a gully, which (owing to my being ahead with Windich, and my brother not seeing a note I left telling him to camp there while I went on to get a view ahead) we did not camp at. Passing this at 10 miles we reached a low spinifex hill capped with rock, from which a remarkable hill was visible, which I named Mount Davis (after my friend Mr. J. S. Davis). Mount Salvado was also visible. Spinifex in every direction and the country very miserable and unpromising. I went ahead with Windich; steering about N. 15° E. for about 8 miles over spinifex sand hills, we found a spring in a small flat which I named Pierre Spring (after my companion Tommy Pierre); it was surrounded by the most miserable spinifex country, and is quite a diamond in the desert. We cleared it out and got sufficient water for our horses. To the north, south, and east, nothing but spinifex sand hills in sight.

30th (Saturday).—Steering E.N.E. over spinifex red sand hills for 9 miles we came to a valley and followed down a gully running N.N.E. for 2 miles, when it lost itself on the flat, which was wooded and grassy. About a mile further on we found a clay-pan with water, and camped with very good feed. The country is very dry, and I should think there has not been any rain for several months. The appearance of the country ahead is better than it looked yesterday. I went ahead with Windich to-day, and found the water.

June 1st (Monday).—In collecting the horses we came on an old native camp, and found the skull of a native at it, much charred, evidently the remains of one they had eaten. Continued on about north-east along a grassy flat, and at 5 miles passed some clay-pans of water, after which we entered spinifex, which continued for 15 miles, when we got to a range, rocky, but covered with spinifex. Myself and Windich were in advance, and after reaching the range we followed down a flat about north for 6 miles, when it joined another larger watercourse, both trending N.N.W. and north-west. We followed down this river, for about 7 miles, in hopes of finding water, without success. Night was fast approaching, and I struck north for 4 miles to a range, on reaching which the prospect was very poor; it proved to be a succession of spinifex sand hills, and nothing but spinifex hills were in view to the north-east and east. It was just sundown when we reached the range; we then turned east for 2 miles, and south,

following along all the gullies we came across, but could find no water. It was full moon, so that we could see clearly; we turned more to the westward and struck our outward track, and following back along them we met the party encamped at the junction of the two branches mentioned before. We kept watch over the horses to keep them from straying. Mine and Windich's horses were nearly knocked up, and Windich himself was very ill all night.

2nd (Tuesday).—Early this morning went with Pierre to look for water, while my brother and Windich went on the same errand. We followed up the brook about south for 7 miles, when we left it and followed another branch about S.S.E., ascending which, Pierre drew my attention to swarms of birds, paroquets, &c., about half-a-mile ahead. We hastened on, and to our delight found one of the best springs in the colony. It ran down the gully for 20 chains, and is as clear and fresh as possible, while the supply is unlimited. Overjoyed at our good fortune, we hastened back, and finding that my brother and Windich had not returned, packed up and shifted over to the springs, leaving a note telling them the good news. After reaching the springs we were soon joined by them: they had only found sufficient water to give their own horses a drink: they were rejoiced, also, to find it such a nice spot.

Named the springs the Weld Springs, after His Excellency Governor Weld, who has always taken such great interest in exploration, and without whose influence and assistance this Expedition would not have been organized. There is splendid feed all round. I intend giving the horses a week's rest here, as they are much in want of it, and are getting very poor and tired.

8th (Monday).—Started with Tommy Pierre to explore the country E.N.E. for water, leaving instructions for my brother to follow after us to-morrow with the party. We travelled generally E.N.E. for 20 miles over spinifex undulating sand hills, without seeing any water. We turned east for 10 miles to a range, which we found to be covered with spinifex; and everywhere nothing else was to be seen; no feed at all, and destitute of water; a few small gullies ran out of the low range, but all were dry. Another range about 24 miles distant was the extent of our view, to which we bore. At 20 miles, over red sandy hills covered with spinifex and of the most miserable nature, we came to a narrow samphire flat, following which south for 2 miles, we camped without water and scarcely any feed; our horses being knocked up, having come over 50 miles over heavy ground. The whole of the country passed over today is covered with spinifex, and is a barren, worthless desert.

9th (Tuesday).—At daybreak, continued east about 4 miles to the range seen yesterday, which we found to be a low stony rise, covered with spinifex. The view was extensive and very gloomy. Far to the north and east spinifex country, level, and no appearance of hills or watercourses. To the south were a few very low ranges, covered also with spinifex; in fact, nothing but spinifex in sight, and no chance of water. Therefore I was obliged to turn back, as our horses were done up; travelling south for 5 miles, we then turned W.N.W. until we caught our outward tracks, and following back we met the party at 3 o'clock, coming on, about 20 miles from the Weld Springs. Our horses were completely done up, and we had not had any water for 31 hours. We all turned back, retreating towards the spring, and continued on till 10 o'clock, when we camped in the spinifex and tied up the horses.

10th (Wednesday).—We travelled on to the spring, which was only about 3 miles from where we slept last night, and camped. I intend staying here for some time, until I find water ahead or we get some rain. We are very fortunate in having such a good depôt, as the feed is very good. We found that about a dozen natives had been to the spring while we were away. They had collected some of the emu feathers, which were lying all about. Natives appear to be very numerous, and I have no doubt but there are springs in the spinifex or valleys close to it.

13th (Saturday).—About 1 o'clock Pierre saw a flock of emus coming to water, and went off to get a shot. Kennedy followed with the rifle. I climbed up on a small tree to watch them. I was surprised to hear natives' voices, and looking towards the hill I saw from forty to sixty natives running towards the camp, all plumed up and armed with spears and shields. I told Sweeney to bring out the revolvers; descended from the tree and got my gun and cooeyed to Pierre and Kennedy, who came running. By this time they were within 60 yards, and halted. One advanced to meet me and stood 20 yards off; I made friendly signs and he did not appear very hostile, but all at once one from behind came rushing forward (probably a chief) and made many feints to throw spears, and went through many manœuvres, and gave a signal, when the whole number made a rush towards us with their spears shipped, and yelling and shouting. When within 30 yards I gave the word to fire: we all fired as one man, and only one report was heard. I think one or two got a few shots, but they all ran away up the hill and there stood, talking and haranguing and appearing very angry. We re-loaded our guns and got everything ready for a second attack, which I was sure they would make. We

were not long left in suspense. They all descended from the hill and came on slowly towards us. When they were about 150 yards from us I fired my rifle and we saw one of them fall, but he got up again and was assisted off. On examining the spot we found the ball had cut in two the two spears he was carrying; he also dropped his wommera, which was covered with blood, and we could follow the blood drops for a long way over the stones. I am afraid he has got a severe wound. My brother and Windich being away we were shorthanded. They seem determined to take our lives, and therefore I shall not hesitate to fire on them should they attack us again. I do this and write this in all humility, and consider it a necessity, as the only way of saving our lives. I write this at 4 P.M., just after the occurrence, so that should anything happen to us my brother will know how and when it occurred. 5 P.M.—The natives appear to have made off. We intend sleeping in the thicket close to camp, and keeping a strict watch, so that we will be ready for them should they return to the attack this evening. At 7.30 my brother and Windich returned, and were surprised to hear of our adventure. They had been over 50 miles from camp E.S.E., and had passed over some good feeding country, but had not found a drop of water; they and their horses had been over 30 hours without water.

14*th* (*Sunday*).—The natives did not return to the attack last night. In looking round camp we found the traces of blood, &c., where one of the natives had been lying down. This must have been the foremost man, who was in the act of throwing his spear, and who urged the others on. Two therefore, at least, were wounded, and will have cause to remember the time they made their murderous attack upon us. We worked all day putting up a stone hut, 10 by 9 feet, and 7 feet high, thatched with boughs. We finished it, and it will make us safe at night; it is a very fair hut, and will be a great source of defence. Hope to have rain, as without it we cannot proceed.

16*th* (*Tuesday*).—Left the Weld Springs with Windich and a packhorse carrying 14 gallons of water. Steered south-east for 12 miles over spinifex, after which we got into a grassy ravine, which we followed along 3 miles, passing some fine clay-holes which would hold plenty of water if it rained. We then turned E.N.E. for 12 miles over miserable spinifex country, when we struck the tracks of my brother and Windich on their return, June 13th. We followed along them south-east for 4 miles, and then south-east to a bluff range about 18 miles, which we reached at sundown. Spinifex generally, a few grassy patches intervening, on which were numbers of kangaroos; we camped

close to the bluff and gave the horses one gallon of water each out of the cans.

17*th* (*Wednesday*).—The horses did not ramble far, and we got off early and followed along and through the ranges in a general E.S.E. course for about 18 miles—passed some splendid clay-pans quite dry. The flats around the ranges are very grassy and look promising eastwards, but we cannot find any water. Kangaroos and birds are numerous, too. Being about 70 miles from camp we cannot go any further or our horses will not carry us back. We turned, therefore, keeping to the south of our outward track, and at about 11 miles found some water in some clay-holes, and camped at about 3 o'clock in the afternoon. There is sufficient water to last the party about a week, but not more.

18*th* (*Thursday*).—Rained lightly last night, and we had a nice shower this morning. We did not get very wet, as we had our waterproofs. Fearing that the rain would obliterate the tracks and the party would be unable to follow them, I decided to return towards Weld Springs, and therefore followed along our outward track, finding, to our sorrow, that there had been no rain west of our last night's camp. We pushed along and got within 18 miles of Weld Springs and camped without water, having left the cans behind, thinking we would find plenty of rain water.

19*th* (*Friday*).—We had to go about two miles for our horses this morning; after which, we made all haste towards Weld Springs, as I knew the party would be coming on along our tracks to-day. When we were within 6 miles of the spring we met the party, and as we were obliged to take our horses to water, I decided that all should return and make a fresh start to-morrow. The natives had not returned to the attack during our absence, so I conclude they do not intend to interfere with us further. On our way to-day we passed some fine rock-holes, but all were quite dry.

20*th* (*Saturday*).—Started at 9.30 A.M., and marched south-east towards the water found on the 17th, for 24 miles; thence E.S.E. for 8 miles, and camped without water on a small patch of feed. The last 10 miles over clear spinifex country of the most wretched description. The country all the way, in fact, is most miserable and intolerable.

21*st* (*Sunday*).—Got an early start, and continued on E.S.E. At about 3 miles found a spring on a small patch of feed in the spinifex and camped, but found, after digging it out, that scarcely any water came in. I have no doubt but that it will fill up a good deal in the night, but our horses being thirsty I re-saddled and pushed on to the water about 16 miles ahead,

which we reached at 4 P.M. There is not more than a week's supply here, therefore I intend going ahead with Pierre to-morrow in search of more. The country ahead seems promising, but there is a great deal of spinifex nearly everywhere. From Weld Springs to our present camp is all spinifex, with the exception of a few flats along short gullies.

22nd (Monday).—Left camp, in company with Tommy Pierre, with a pack-horse carrying 15 gallons of water. Steered south-east for 4 miles, then east for about 8 miles over fine grassy country, then south-east towards a high range, about 25 miles distant. After going about 3 miles struck a flat trending S.S.E., which we followed down about 4 miles, passing two small clay-holes with water in them; after this we struck south-east for 4 miles and came to a large brook trending south-east, which we followed along until it lost itself on the plain about 6 miles. Fine grassy country all the way, and game abundant. There were a few gallons of water here and there in the brook, but none large enough to camp at. I then turned east, and at about 7 miles reached the high hill seen this morning, which I named Mount Moore (after Mr. W. D. Moore, of Fremantle), ascending which we had a fine and extensive view to the south-west, south, and south-east. Fine grassy country all round and very little spinifex. To the south, about 9 miles, we saw a lake, and further off a remarkable red-faced range, which I named Timperley Range (after my friend, Mr. W. H. Timperley). A remarkable peak, with a reddish top, bore S.S.E., which I named Mount Hosken (after Mr. M. Hosken, of Geraldton). I made south towards the lake, and at 1½ mile came on to a gully in the grassy plain, in which we found abundance of water, sufficient to last for months. We therefore camped for the night, with beautiful feed for the horses. I was very thankful to find so much water and such fine grassy country, as, if we had not found any this trip, we would have been obliged to retreat towards Weld Springs, the water where I left the party being only sufficient to last a few days. The country passed over to-day was very grassy and very little spinifex, and it looks promising ahead. Distance from camp about 35 miles.

23rd (Tuesday).—Steering south for about 8 miles, we reached the lake, which I named Lake Augusta. The water is salt and about 5 miles in circumference; it appeared deep, and swarmed with ducks and swans; grassy country in the flat, red sand hills along the shore. Pierre shot two ducks, after which we pushed on north-east for about 12 miles to a low rocky bluff, which we ascended and got a view of the country ahead; rough broken ranges to the east and south. We continued on east for 6 miles, when, on approaching a rocky face of a range, we saw some

natives on top of it watching us. Approaching nearer we heard them haranguing and shouting, and soon after we came within 30 yards of one who was stooping down looking intently and amazingly at us. I made friendly signs, but he ran off shouting, and apparently much afraid. He and several others ran up and joined those on the cliff summit, and they all made off. We turned, and steered E.N.E. for 6 miles and then east for about 14 miles, the last few miles being miserable spinifex country; we camped, with poor feed, amongst some spinifex ranges. A good deal of grassy country the first part of the day; kangaroos very numerous, and emus also. Evidences of the natives being numerous.

24th (Wednesday).—Ascended a red-topped peak close to our bivouac and got a view ahead. A salt lake was visible a few miles to the east, towards which we proceeded. Passing along samphire flats and over red sandhills, we got within a mile of the lake. The country close to it not looking promising, I determined to turn our faces westward towards the party. Steering a little south of west for 3 miles, we struck a large brook trending north-east into the lake, and following it up a mile found a fine pool of fresh water with splendid feed. This is very fortunate, as it is a fine place to bring the party to. Elated with our success we continued on westerly, passing some fine rock water-holes, half full of water, and at 20 miles from the pool we found a springy hole, with plenty of water in it, within a few hundred yards of our outward track. We had missed it going out; it is in the centre of a very fine grassy plain. Kangaroos and emus numerous, and natives too. Giving the horses water we pushed on for 12 miles and camped on some fine grassy flats. Every appearance of rain.

25th (Thursday).—Having finished all our rations last night, I shot two kangaroos while out for the horses, and brought the hind-quarters with us. Continuing westerly for about 10 miles we reached the water, our bivouac on the 22nd. I awaited the arrival of the party, which should reach here this morning. At two o'clock heard gun-shots and saw my brother and Windich walking towards us. Found that they had missed our tracks and were camped about a mile higher up the gully at some small clay-holes; we got our horses and accompanied them back. Rained this evening more than we have had before. Everything had gone on well during my absence.

26th (Friday).—Did not travel to-day, as there was good feed and water at this camp. My brother, Windich, and Pierre rode over to Lake Augusta to get some shooting, and returned in the afternoon with a swan and two ducks. On their way out they saw a native and gave him chase. He climbed up a small tree,

and although Windich expended all his knowledge of the languages of Australia to get him to talk, he would not open his lips, but remained silent; they therefore left him to get down from the tree at his leisure.

27th (*Saturday*).—Erected a cairn of stones on south-east point of Mount Moore, after which continued on and reached the spring found by me on the 24th, distance 15 miles; the last 6 miles poor spinifex country. Fine and grassy round spring.

29th (*Monday*).—Reached the pool found by me on the 24th; distance 17 miles. Splendid feed round camp. About 2 miles west of camp I ascended a remarkable hill and took round of bearings, naming it Mount Bates (after the Secretary of the Royal Geographical Society).

30th (*Tuesday*).—Left camp $\frac{F}{52}$ in company with Tommy Windich (taking one pack-horse) to find water ahead, eastward. Steered E.N.E. over salt marshes and spinifex sand hills, and at about 11 miles found water in some clay-pans, and left a note telling my brother to camp here to-morrow night. Continued on and found several more fine water-pans and fine grassy patches. Ascended a range to get a view ahead. In every direction spinifex, more especially to the north; to the east some low ranges were visible, about 20 miles distant, towards which we proceeded. On our way we surprised an emu on its nest and found several eggs; we buried four, with a note stuck over them, for the party to get when they came along, and took three with us. Soon after this the horse Windich was riding (Mission) gave in, and we had great difficulty in getting him along. I was very surprised at this, for I considered him the best horse we had. We reached the range and found water in some of the gorges, but no feed; spinifex everywhere. We continued on till dark, passing some natives' fire, which we did not approach, when we camped with scarcely any feed. I hope to have better luck to-morrow. We have found plenty of water, but no feed: this is better than having no water and plenty of feed. We had one wurrung, four chockalocks, and three emu eggs, besides bread and bacon, for tea to-night, so we fared sumptuously.

July 1st (*Wednesday*).—Got off early and continued easterly to a low stony range, 3 miles off, over spinifex sandy country. Found a rock water-hole, and gave our horses a drink. Continuing about east to other ranges, which we followed along and through, and from range to range, spinifex intervening everywhere and no feed, a few little drops of water in the gullies, but not sufficient for the party to camp at. When we had travelled about 15 miles we turned north for 3 miles, and again east through and over some ranges. No feed, and scarcely any water. Saw a range about 25 miles further east; spinifex all the way

to it. Mission being again knocked up, although carrying only a few pounds, we camped about three o'clock at a small hole of water in a gully, large enough, however, to serve the party one night—the first seen to-day that would do that. The last forty miles is the most wretched country I have ever seen—not a bit of grass and no water, except after rain; spinifex everywhere. We are very fortunate to have a little rain-water, or we could not get ahead.

2nd (*Thursday*).—Steered towards the range seen yesterday a little south of east, and after going 12 miles my horse completely gave in, Mission doing the same also. I had hard work to get them along, and at last they would not walk. I gave them a rest and then drove them both before me, following Windich till we reached the range. Found a little water in a gully, but no feed. Spinifex all the way to-day; most wretched country. We ascended the range, and the country ahead looks first-rate; high ranges to the north-east, and apparently not so much spinifex. We continued north-east, and after going 4 miles camped on a patch of feed, the first seen for the last 60 miles. I was very tired, having walked nearly 20 miles, and having to drive two knocked-up horses. I have good hopes of getting both feed and water to-morrow, for, if we do not, we will be in a very awkward position.

3rd (*Friday*).—Soon after starting found a little water in a gully and gave our horses a drink. Ascended a spur of the range and had a good view ahead, and was very pleased with the prospect. Steering north-east towards a large range, about 15 miles off, we found a great deal of spinifex, although the country generally was thickly wooded. I rode Mission, who went along pretty well for about 12 miles, when Williams gave in again, and Mission soon did the same. For the next 6 miles to the range we had awful work, but managed, what with leading, driving, &c., to get to the range; spinifex all the way to it and up on top of it. I was very nearly knocked up myself, but ascended the range and had a very extensive view. Far to the north and east the horizon was as level and uniform as that of the sea, apparently spinifex everywhere; no hills or ranges could be seen for a distance of quite 30 miles. The prospect was very cheerless and disheartening. Windich went on the only horse that was not knocked up to find water for our horses. I followed after his tracks, leading the two poor done-up horses. With difficulty I could get them to walk; over and through the rough range I managed to pull them along and found sufficient water to give them a good drink, and camped on a small patch of rough grass in one of the gorges. Spinifex everywhere: it is a most fearful country. We cannot proceed further

in this direction, and must return and meet the party, which I hope to do to-morrow night. We can only crawl along, having to walk and lead the horses, or at least drag them. The party have been following us and only getting a little water from gullies, and there is very little to fall back on for over 50 miles. I will leave what I intend doing until I meet them.

4th (Saturday).—We travelled back towards the party, keeping a little to the west of our outward track; and after going 5 miles found some water in clay-holes, sufficient to last the party about one night. Two of our horses being knocked up, I made up my mind to let the party meet us here, although I scarcely know what to do when they arrive. To go forward looks very unpromising, and to retreat we have quite 70 miles with scarcely any water and no feed at all. The prospect is very cheerless, and it all depends on the state of the horses when they reach here what I shall do. It is very discouraging to have to retreat, as Mr. Gosse's furthest point west is only 200 miles from us. We finished all our rations this morning, and we have been hunting for game ever since 12 o'clock, and managed to get a wurrung and an opossum, the only living creatures seen, and which Windich was fortunate to capture.

5th (Sunday).—Early this morning Windich and I went in search of more water. Having nothing to eat, it did not take us long to have a little drink of water for our breakfast. Went a few miles to the north-west, and looked all round, but only found a small rock water-hole. Windich got an opossum out of a tree. We returned at about 12 o'clock and ate the opossum. At about 1 o'clock we saddled up and made back towards the party, which I thought should have arrived by this time. When about 2 miles we met them coming on; they had been obliged to leave two horses on the way, knocked up, one named Fame about 24 miles away, and Little Padbury about 8 miles back; all the others were in pretty good trim, although very hungry and tired. We returned to the little water, and they soon finished it. I was glad to meet the party again, although we were in a bad position. Intend returning to-morrow to the range left by the party this morning, where there is enough water for half-a-day, and search that range more thoroughly. The horses will have a good night's feed, and I have every confidence that, if the worst comes, we will be able to retreat to a place of safety. Found my brother in good spirits, and soon felt quite happy and viewed the future hopefully. I was sorry to lose the horses, but we cannot expect to get on through such a country without some giving in. The country is so dry, and such a dry season, otherwise we could go ahead easily. A good shower of rain is what is required.

6th (Monday).—Retreated to the water left by the party in the range, 14 miles south-west. At 1 mile we gave the horses as much water as they required from some rock-holes. After reaching the water and having dinner, Pierre and myself, and my brother and Windich started off on foot to examine the range for water, but could find only a few gallons. I think there will be sufficient water to last us here to-morrow, and we will give the country a good searching. If we fail we will have to retreat westwards at least 70 miles.

7th (Tuesday).—Early this morning Pierre and I, and my brother and Windich started off in search of water, as there was scarcely any left at camp; and unless we are fortunate enough to find some, retreat is inevitable. Pierre and myself searched the range we were camped in, while Windich and my brother went further south towards another range. We searched all round and over the rough ranges without success, and reached camp at 1 o'clock. To our relief and joy learnt that my brother and Windich had found water about 5 miles S.S.E., sufficient to last two or three weeks. This was good news; and after dinner we packed up and went over to the water. The feed was not very good, but I am very thankful to have found it, as a retreat of 70 miles over most wretched country was anything but cheering.

9th (Thursday).—Very cloudy this morning, although the barometer is rising. My brother and Pierre started on a flying trip; intend following in their tracks on Saturday.

11th (Saturday).—Followed on the tracks of my brother and Pierre, south 7 miles, to a rough broken range. Spinifex and rough grass all the way. Thence we turned south-east for 3 miles; then north-east and east over most wretched spinifex plains for 9 miles, when we got on to a narrow grassy flat, and following it along about 4 miles came to some water in a clay-pan, sufficient for the night, and camped. With the exception of this narrow flat the country passed over to-day is most miserable and worthless, and very dusty. Very hot day.

12th (Sunday).—Our horses finished all the water. We got off early, and steered east, following my brother's and Pierre's tracks for 8 miles, when we reached a low rise, and a fine rock water-hole holding over a hundred gallons of water. While we were watering our horses we heard gun shots, and soon beheld my brother and Pierre returning. They had good news for us, having found some springs about 25 miles to the eastward. They had seen many natives.

13th (Monday).—Steering straight for the water found by my brother, about E.S.E. for 25 miles, over most miserable spinifex country without a break. Just before we got to the water

Windich shot an emu. We saw two natives, who made off. Many fires in every direction. Fine water at this place; I have no doubt water is always here. I named it the Alexander Spring, after my brother, who discovered it. Abundance of water also in rockholes.

14*th* (*Tuesday*).—Rested at Alexander Spring.

15*th* (*Wednesday*).—Went for a walk to a flat-topped hill about S.S.E., 50 chains from camp, which I have since named Mount Allott, and placed a cairn on it; another hill close by I named Mount Worsnop, after respectively the Mayor and Town Clerk of Adelaide. Found two natives' graves close to camp; they were apparently about two feet deep and covered with boughs and wood; they are the first I have ever seen in all my travels to the eastward in Australia, and Windich says he has never come across one before, either. We also found about a dozen pieces of wood, some 6 feet long and 3 to 7 inches wide, and carved and trimmed up. All around were stones put up in the forked trees. I believe it is the place where the rite of circumcision is performed.

16*th* (*Thursday*).—Left Alexander Spring in company with Windich to look for water ahead. Steered east for 12 miles, over spinifex sand hills with some salt marsh flats intervening. We then turned south-east for 7 miles to some cliffs, and followed them along east about 1½ mile, when we saw a clear patch a little to the north-east, on reaching which we found a fine rock water-hole holding over 100 gallons of water. We had a pannikin of tea, and gave our horses 1½ hour rest. Left a note for my brother, advising him to camp here the first night. We continued on a little to the south of east for about 15 miles over spinifex plains, when we camped on a small patch of feed. Saw a fire about three-quarters of a mile south of our camp, and supposed it to be natives camped.

17*th* (*Friday*).—Early this morning we proceeded to where we saw the fire last night, but could not see any natives (it must have been some spinifex burning). We continued about east for 2 miles; found a rock water-hole holding some 50 gallons, and had breakfast. After this, continued on a little south of east for 12 miles, when we turned more to the north, searching every spinifex rise that had a rocky face, first north and then north-west and west, all over the country, but not over any great extent, as my horse (Brick) was knocked up. About 1 o'clock we found enough to give our horses a drink and to have some tea ourselves. We saw some low cliffs to the north, and proceeding towards them we saw ahead, about N.N.E., a remarkable high cliff; I therefore decided to make for it. I had to walk and drive my horse before me, and before we reached the cliff

we had hard work to get him to walk. When we got close we were rejoiced to see cliffs and gorges without end, and descending the first hollow found a fine rock-hole containing at least 250 gallons. We therefore camped, as it was just sundown. I am very sanguine of finding more water to-morrow, as our horses will soon finish this hole. There is very little feed about the water.

18th (Saturday).—This morning we began searching the ranges for water. First tried westerly, and searched some fine gullies and gorges, but without success. My horse soon gave in again, and I left him on a patch of feed and continued our search on foot. I had not walked a quarter of a mile before I found about 200 gallons in a gully, and following down the gully we found a fine pool in a sandy bed, enough to last a month. We were rejoiced at our good fortune, and returning to where we left the horse, camped for the remainder of the day. There is not much feed anywhere about these cliffs and gullies, but as long as there is plenty of water the horses will do very well. To-morrow I intend going back to meet the party, as the way we came is very crooked, and we will save them many miles. It is certainly a wretched country we have been travelling through for the last 2 months, and, what makes it worse, the season is an exceptionally dry one; it is quite summer weather. However, we are now within 100 miles of Mr. Gosse's furthest west, and I hope soon to see a change for the better. We have been most fortunate in finding water, and I am sure I am very thankful for it.

19th (Sunday).—Started back to meet the party, leaving old Brick hobbled, and my saddle, rug, &c., hidden in a tree. After travelling about 20 miles met them coming on all right. Everything had gone on well during my absence. They had slept last night at the rock-hole found by us on the 16th, and had had sufficient water for the horses last night out of it. The note I left had been taken away by the natives, who were very numerous about there. Many tracks were seen following mine and Windich's for several miles. The party had not, however, seen any of them. They were rejoiced to hear of the water ahead, and we steered for it, keeping to the west of our return route to search some cliffs on our way for water. After travelling 9 miles we camped without water, on a grassy flat close to some cliffs; most miserable spinifex country all day; this is the first grass seen. Walked over 20 miles to-day myself.

20th (Monday).—Steered north-east straight for the water found on the 18th for 14 miles; reached it and camped. Found the horse (Brick) I left behind, and saddle, rug, &c., as we left

them. Horses were very thirsty, but there is plenty of water for them. Feed is rather scarce. I named this creek and pool after the Honourable Arthur Blyth, Chief Secretary of South Australia.

22nd (Wednesday).—Started in company with Pierre to look for water ahead, steered a little north of east for about 12 miles to the point of the cliffs, and ascended a peak to get a view ahead. The line of cliff country ran north-east, and to the east, spinifex undulating country; nevertheless, as I wished to get a view of some of the hills shown on Mr. Gosse's map, I bore east and E.S.E. for over 30 miles, but could not find a drop of water all day, and we had come nearly 50 miles. Camped on a small patch of feed. Very undulating spinifex country, and no place that would hold water, even after rain, for more than a day or two.

23rd (Thursday).—Decided not to go any further, although I much wished to get a view further to the east, but our horses would have enough to do to carry us back. Steered north for a few miles, and then north-west for 20 miles, thence W.S.W. to camp, which we reached after dark, not having had any water for ourselves or horses since we left it yesterday morning. The weather was very warm, and our horses were done up when we reached camp. On our return we got a fine view to the north-east, which looks more promising.

24th (Friday).—My brother and Windich started in search of water.

26th (Sunday).—Rested at camp. My brother and Windich returned late this evening, having been over 60 miles to the E.N.E., and having found only one small rock water-hole with water in it. Many rock-holes had been seen; but all dry; and they had met several natives. One woman and a child they had caught and talked to. She did not seem frightened, and ate readily the damper and sugar given her. The country seems even more parched than it has been, which I had thought scarcely possible. A range and flat-topped hill were seen about 15 miles to the east of their furthest point, but they were unable to reach it.

28th (Tuesday).—Left camp in company with Windich to look for water ahead, taking a pack-horse and 10 gallons of water, besides two small tins for our own use. Steered north-east nearly along my brother's tracks for 20 miles, and reached the water in the rock-hole seen by him, and had dinner. In the afternoon continued on a little south of east for about 7 miles. Camped without water for the horses on a small patch of old feed. The weather is dark and cloudy, and there is much thunder about.

29th (*Wednesday*).—Rained lightly during the night; my rug got wet. Thinking we would get plenty of water ahead, I left the drums and water, as the horses would not drink. We steered about east over miserable spinifex country and cut my brother's return tracks. Passed a rock-hole seen by him, and found only a few pints of water in it, proving to us that very little rain had fallen. We sighted the range and hill seen by my brother and reached it at sundown. I have named it the Todd Range, and the highest hill, which is table-topped, I have named Mount Charles (after Mr. C. Todd, C.M.G., Postmaster-General of South Australia). No sign of water, and apparently very little rain has fallen here last night. Found an old natives' encampment, and two splendid rock-holes quite dry; if full they would hold 700 or 800 gallons. Was very disappointed at this, and it being now after dark we camped without water for the horses, having travelled over 40 miles. Before we reached the range we had most miserable spinifex sand hills. Scarcely any feed in the range, and spinifex everywhere. What grass there is must be over two years' old.

30th (*Thursday*).—Very thick fog this morning. We bore north for 4 or 5 miles, and then south-east for about 5 miles, when we got a fine view to the east, and could see some hills, which are no doubt near Mr. Gosse's furthest west. They bore south-east about 18 miles distant. I could not go on to them as I was afraid the party would be following us, on the strength of the little rain we had the night before last. Reluctantly, therefore, we turned westward, and soon after came to an old native encampment with a rock-hole quite dry, which would hold 1000 gallons if full. It must be a long while since there has been any rain, or it would not have been dry. We continued on, searching up and down and through the Todd Ranges, finding enough for our horses from the rain. Late in the afternoon we found another camping place with 4 rock-holes quite empty, which if full would hold 3000 or 4000 gallons at least. This was very disheartening, and we felt it very much. It appeared to us that there was no water in this country at this season, and we felt it was useless looking for it. We now decided to make back towards the party, and not being certain that my brother would not follow, on the strength of the rain, determined to bear south-west until we struck our outward tracks. After going 6 miles camped without water, and nothing but some old coarse scrub for the horses. One good shower of rain would enable us to move over this country easily; but in this season, without rain, it is quite impossible to move a number of horses.

31st (*Friday*).—Steering about south-east towards our out-

ward tracks, came across a native with his wife and two children, the youngest about two years old. As soon as they saw us the man, who had a hand full of spears, began talking at us and then ran off (the oldest child following him), leaving his wife and the youngest child to take care of themselves. The child was carried on its mother's back, and hung on without any assistance. Thus encumbered, the woman could not get away. She evidently preferred facing any danger to parting with her child. Windich spoke to her, and she talked away quietly, and did not seem very afraid. We could not understand anything she said, and allowed her to follow her husband, who certainly did not come up to our standard of gallantry. We continued on until we reached our outward tracks, and I was much relieved to find that the party had not gone on. We found a little water in a small rock-hole, and rested two hours, as our pack-horse (Little Brown) was knocked up. We continued on about 5 miles, and camped on a patch of feed in a range, without water. Little Brown was so knocked up that we had great difficulty in getting him to walk.

August 1st (Saturday).—Steering westerly for about 8 miles, reached our bivouac of the 28th, and gave our horses the water from the drums. Continued on, making straight for camp; stayed two hours to give the horses a rest, and when within 15 miles of camp found a rock-hole with about 100 gallons of water in it. Little Brown completely gave in, and we were obliged to leave him. Pushed on and reached the party a little after dark, and found all well, having been absent five days, in which time we had travelled about 200 miles.

2nd (Sunday).—My brother and Pierre went on a flying trip to the south-east in search of water. Kennedy and myself went and brought Little Brown and pack-saddle, &c., to camp. Windich shot an emu; saw about 20.

I now began to be much troubled about our position, although I did not communicate my fears to any but my brother. We felt confident we could return if the worst came, although we were over 1000 miles from the settled districts of Western Australia. The water at our camp was fast drying up, and would not last more than a fortnight. The next water was 60 miles back, and there seemed no probability of getting eastward. I knew I was now in the very country that had driven Mr. Gosse back (I have since found that it did the same for Mr. Giles). No time was to be lost. I was determined to make the best use of the time that the water would last, and to keep on searching. Even now, months after the time, sitting down writing this journal, I cannot but recall my feelings of

anxiety at this camp. Just when the goal of my ambition and my hopes for years past was almost within my reach, it appeared that I might not even now be able to grasp it. The thought of having to return, however, brought every feeling of energy and determination to my rescue, and I felt that with God's help I would even now succeed. I gave instructions to allowance the party, to make our stores last at least 4 months, and made every preparation for an almost desperate struggle.

4th (Tuesday).—A light shower of rain this morning. Rested at camp. My brother and Pierre returned this evening, having found a few small rock water-holes, but not sufficient to shift on; they had been about 50 miles E.S.E., and had passed over most miserable spinifex country the whole way. They had not had any rain, not even the light shower we had this morning. They had seen four natives but did not get near enough to talk to them. I intend going with Windich ahead to-morrow, in the hope that rain may have fallen last night to the E.N.E. The weather, which had looked threatening all day, cleared off this evening.

5th (Wednesday).—Thinking that rain might have fallen to the north-east, I left camp with Windich to ascertain, instructing my brother to follow on the 7th, and before leaving to bury some flour and everything that could be dispensed with, and to carry all the drums full of water. He has since informed me that he buried on left bank of brook, 7 yards north of a small tree with a tin plate nailed on it, on which is written: "DIG 7 yds. N.," two pack-bags, containing 135 lbs. flour, six leather water bottles, two tomahawks, one pick, one water canteen, one broken telescope, three emu eggs, some girths and straps, one shoeing hammer, 1 lb. candles (and one lantern hanging on a tree). A bottle was also buried, with a letter in it, giving the latitude and longitude of the camp, and a brief outline of our former and future intended movements. We reached the rock-holes about north-east 20 miles, and were delighted to see them full, besides plenty on the rocks. This was very encouraging, and after resting two hours we pushed on E.N.E., to a range visited by my brother on his last flying trip, and which I named the Baker Range, and the highest point Mount Samuel (after Sir Samuel Baker, the Great African Explorer), and could see that some rain had fallen, although much more in some places than in others. Travelled till after dark through and over spinifex plains, wooded with acacia and mulga scrub, and camped without water and only a little scrub for the horses, having travelled nearly 40 miles.

6th (Thursday).—Our horses strayed during the night. After we had found them we proceeded to the Baker Range and

found water in a gully on some rocks, and also the rock-holes seen by my brother and Windich on their former trip had a good deal in them. I was greatly delighted at this; there must have been a good shower or two here. Before reaching the water Windich shot a turkey, which we roasted and ate for breakfast, not having had any tea last night. We rested here about two hours. Continuing on E.N.E. for about 16 miles, came to the four large rock-holes seen by Windich and myself on our former trip. They were quite dry, but, as we suspected, there was a good deal of water in a rocky gully close by. About 2 miles before we reached here we passed a rock-hole full of water, about 60 gallons. I left a note telling my brother to camp here on Sunday night, and to follow on our tracks on Monday. We continued on about 5 miles, and camped not far from Mount Charles, without water for the horses; they were not thirsty. So far we have been most fortunate, although there is very little to fall back on should we be unable to proceed; in fact, as soon as the surface water dries up it will be impossible. We are, however, three days in advance of the party, and if we can get enough for our two riding horses we will be able to stop them before there is any great danger, although we may lose some of the horses.

7th (Friday).—Steered S.S.E. for about 4 miles to two large rock-holes seen by Windich and myself on our former trip, but found them quite dry, as before. Continued on south-east towards the hills seen by us formerly, and after travelling about 10 miles got a fine view of the country, which looked splendid. High hills and ranges as far as could be seen to the south and east, and we thought all our troubles were over. We pushed on about E.S.E. to a high hill about 10 miles off, over red sand hills covered with spinifex. Country of the most miserable description. We reached the hill, which I named Mount Harvest (after Colonel Harvest, the Acting Governor of Western Australia at the time of our departure), and ascended it, when more ranges and hills were seen,—in fact, the whole country was one mass of hills and ranges to the south, south-east, and east. We followed down gullies and over hills, passing two rock-holes dry, until after dark, but could not find any water. The country is most beautifully grassed, and is a great relief after travelling over so many hundreds of miles of spinifex; but the season is so dry, and all the gullies are dry. We camped for the night without water for ourselves or horses. I have since learnt that these ranges were seen by Mr. Giles, and were named the Warburton Ranges.

8th (Saturday).—Early this morning Windich and I went on foot to search the hills and gullies close around, as our horses

were knocked up for want of water. We returned unsuccessful about 8 o'clock. Close to where we found our horses we found a tree with the bark cut off one side of it with an axe which was sharp. We were sure it was done by a white man, as the axe, even if possessed by a native (which is very improbable), would be blunt. We are now in the country traversed by Mr. Gosse, although I am unable to recognize any of the features of the country, not having his map with me, and not knowing the latitude. Should we find water, and the party reach here, there will no doubt be little difficulty in distinguishing the hills. The country certainly does not answer the description given of his furthest westward. However I will leave our position geographically for the present, and treat of what is of much more importance to us, viz., the finding of water. We saddled our horses and continued our search about south-east, over hills and along valleys; the distance or direction I am unable to give; our horses scarcely moving, and ourselves parched with thirst. The sun was very hot. At about noon we found some water in a gully by scratching a hole, but it was quite salt. Our horses would not drink it, so it can be imagined how salt it was. We drank about a pint of it, and Windich said it was the first time he had ever had to drink salt water. I washed myself in it, which refreshed me a little. Our horses could not go much further without water, but we crawled along about north and shortly after found a small rock-hole in the side of a large rough granite hill, with about 5 gallons of good water in it. We had a good drink ourselves, put half a gallon into a canteen, and gave the rest to the horses. From here our usual good fortune returned. We had not gone far when Windich called me back and said he had found horses' tracks, and sure enough there were the tracks of horses coming from the westward. Windich took some of the old dung with him to convince our companions that we had seen them. We followed westward along the tracks for half-a-mile, when we found two or three small rock-holes with water in them, which our horses drank. Still bearing to the north we kept finding little drops in the granite rocks (our old friend the granite rock has returned to us again, not having seen it for several hundred miles), and after satisfying our horses, rested a short time to have something to eat, not having had anything for forty-eight hours. We bore north-west, and soon after found a fine rock-hole of water in granite rocks, sufficient to last the party a day. Plenty of water on rocks, also, from recent rain here. We were rejoiced, as we now had a place to bring the party to. But our good fortune did not end here: continuing on westerly or a little north of it, we came on a

summer encampment of the natives, and found a native well or spring, which I believe is a good spring if dug out. This may make a good depôt if we require to stay long in this neighbourhood. We were overjoyed; and I need not add I was very thankful for this good fortune. When everything looked at its worst, then all seemed to change for good. We camped 2 miles from the water.

9th (Sunday).—Took our horses back to the water, and on our way found a clay-pan with a few hundred gallons of water in it. Started back to meet the party, intending to await their arrival at the first range we came to on our outward track. Steering a little north of west for 14 miles we camped on west side of Mount Harvest, not having seen a drop of water on our way. Luckily we brought nearly half a gallon with us, so we will be able to manage until the party overtake us to-morrow. Our horses will be very thirsty, but I will give them 5 gallons each out of the drums. Shot a wurrung on the way, which we had for dinner. Found two fine rock-holes quite empty. There appears to have been no rain here, although 15 miles east there has been a good deal. I hope the change of moon on the 11th will bring us some rain, for we will then be able to travel along easily.

10th (Monday).—We rested at our last night's bivouac until 12 o'clock, when we saddled up and followed back along our outward tracks to meet the party, whom we expected to meet this afternoon. About 3 o'clock met them coming on, all well. They were all rejoiced to hear of the water ahead. We gave our horses water out of the drums, and turned eastward with them. We reached Mount Harvest by sundown, the party having travelled 30 miles, and camped on grassy flat without water for the horses.

11th (Tuesday).—Continued on to the water found ahead, and on our way found some clay-holes with water, and satisfied our horses. When near the spring saw natives' tracks, and shortly afterwards a fire with a whole kangaroo roasting in it. The natives had made off when they saw us, leaving their game cooking. Continuing on, and passing the native well, we reached the granite-rocks, 2 miles from the spring, and camped. While having dinner we saw the two natives about a quarter of a mile from us watching us; we beckoned to them, and Windich and I approached them. As we neared them they began talking and moving off slowly; we could not get close to them, although they did not appear to be afraid of us. Some fine ranges are visible from here south-east. We are not in the latitude of Mr. Gosse's track by 15 miles, and the tracks are only about 2 miles south of us. I cannot account for this. The tracks may

be Mr. Giles', as I cannot think Mr. Gosse could be out in his latitude.

12*th* (*Wednesday*).—Left camp with Tommy Windich to find water ahead, instructing my brother to follow on to-morrow. We bore E.S.E. for a few miles over grassy flats towards some high hills, but seeing what we supposed a good hill for water, we turned east towards it, over miserable spinifex sand hills, and found some splendid granite rocks and holes, but not much water—enough, however, to give the horses a drink. If there was rain there would be enough water here for a month or more. Near these rocks found a tree resembling the fig-tree (*Ficus platypoda*), with ripe fruit about the size of a bullet, which tasted very much like a fig. I ate some of them and they were very good. Fine hills and ranges to the eastward, and country very promising and in many places beautifully grassed. After resting two hours we pushed on about east, and after going 5 miles over spinifex sand hills, came to a granite range and found two fine rock-holes, sufficient to satisfy the horses. Continuing on, we camped close to a peaked granite-hill, which I named Mount Elvire, without water for the horses. Found the old horse-track just before we camped, coming from eastward. I cannot make them out to be Mr. Gosse's; they must be Mr. Giles'. There appears to be a great number of horses', but I am not certain if there are any camel tracks.

13*th* (*Thursday*).—Found a rock-hole with about 40 gallons of water in it close to camp. After watering our horses we followed along the old tracks, going nearly north-east, and passed a crow's nest, from which eggs had apparently been taken. Shortly afterwards found where the party had camped without water, and continued on to some high hills and ranges, when we left them to follow some emu-tracks, which, after following up a gully and over a hill, brought us to a fine spring of good water in another gully. We camped here and intend waiting for our party, which will reach here to-morrow. We watched at the water for emus, and after waiting about four hours saw two coming, one of which Windich shot. Fine grass, although old and dry, down this gully. Ranges in every direction. The country contrasts strikingly with what we have been travelling through for the last three months. The party whose tracks we followed this morning have not been to this spring, so they must have missed it. All my troubles were now over, inasmuch as I felt sure we would accomplish our journey and reach the settled districts of South Australia; although, as it afterwards proved, we had many days of hard work and some privation yet to endure. Still the country was much improved and was not altogether unknown and I gave out publicly to the party that we were now in safety

and in all human probability in five or six weeks would reach the Telegraph Line. I need not add how pleased we all were at having at last bridged over that awful desolate spinifex desert.

14*th* (*Friday*).—About one o'clock the party arrived all safe. They reported having seen three natives the day we left, and had induced them to come to camp and had given them damper and sugar and a red handkerchief each; they did not remain long. Each had two spears, very long and thick, and made out of three pieces spliced together, with large barbs on them. The party had finished all the water on their way, the horses yesterday having drank over 10 gallons each. A remarkable hill bore S.S.W. from spring, which I named Mount Palgrave.

15*th* (*Saturday*).—Left camp with Windich to look for water ahead, instructing my brother to follow to-morrow. Steered east along the south side of a rocky range for 10 miles, when we ascended a hill to get a view ahead. About 30 miles to east fine bold ranges were visible, also broken ranges from north-east and round to south-east; they are no doubt the Cavanagh Ranges of Mr. Gosse. About 5 miles ahead we saw some granite rocks, to which we proceeded, and found a tremendous rock-hole full of water; it was in between two large rocks, and completely shaded from the sun. As the country east to the ranges appeared to be all spinifex and red sand hills, I decided to remain here to-night and continue on in the morning. The country passed over to-day was along and through ranges, which are no doubt the Barrow Ranges of Mr. Gosse. The flats are very grassy, but the hills are covered with spinifex. The *Ficus platypoda* was also found here, loaded with ripe fruit.

16*th* (*Sunday*).—Steering about E.N.E. towards the ranges, we passed over very miserable spinifex plains and red sand hills the whole way, about 30 miles. When we reached the ranges we followed up a fine wide flat, splendidly grassed, although old; and on it were innumerable horse-tracks, unmistakable evidence of horses being camped for months in this neighbourhood. Kept on up the gully and flat for about 1½ mile, when Windich found a gumtree marked E GILES OCT. 7, 73. My former suspicions that Mr. Giles must have been in this neighbourhood were now confirmed. Soon after we came on a cart-track which rather astonished us, and soon found that it must have belonged to Mr. Gosse, who also camped close here. A deep well-beaten track went along up the gully, which we followed, knowing it was the daily track of the horses to the water, and soon after found their old camp at a beautiful spring running down the gully a quarter of a mile. A stockyard had been built and gardens made, besides a large bush-hut to shelter the party from the sun as well as rain. Trenches were dug round the hut and

tent, so that they must have had rain. I should say Mr. Giles must have been camped here for two or three months, at least. We camped half-a-mile down the gully from the spring. Mr. Gosse and Mr. Giles were within a few miles of each other at the same time, and did not meet.

17*th* (*Monday*).—Went for a walk to examine the cart-tracks; found two tracks going east and west. This convinced me that the cart belonged to Mr. Gosse, who I knew had returned. Went to the top of a high hill to take angles, while Windich went to try and shoot a kangaroo. After a hard climb I reached the summit, and had just commenced taking angles when I heard three shots, and shortly after Windich cooeying. Looking around I saw a native running along, about 300 yards from me. He disappeared in a hollow. Fearing that Windich had been attacked by the natives, I descended towards him as quickly as possible, but could not see him. I looked about, keeping a sharp look-out and expected to be attacked, but could not find him. Sat down a short time and finally made my way back to the horses, and after finding them, saddled one and started back to look for Windich. Found him coming along with a kangaroo on his back, having shot three and not having seen any natives: he had been waiting for me a good while. After dinner I went back to get my coat and a compass which I had left at the foot of the hill, and again ascended the hill and got a fine round of angles. The rock is very magnetic, and the compass is quite useless. Could see the dust from the party coming across the spinifex sand hills, and descending, met them just before sundown. They reported having had an encounter with the natives on the 16th, and had been followed by a number of armed natives for a long way, and finally they had been compelled to fire on them, but had not killed any. They were glad to hear of the spring found, and continuing on reached it about half-past six o'clock. This spring is Fort Mueller of Mr. Giles, where he was camped for a long while, and his most westerly permanent water.

18*th* (*Tuesday*).—Rested at spring.

19*th* (*Wednesday*).—Steering E.S.E. along Mr. Gosse's track for about 35 miles (with the exception of a few miles at first, along a grassy flat) over most miserable sandy hills and plains of spinifex, two rock-holes passed were quite dry. Camped without water on a grassy flat not far from the ranges; hope to find water early to-morrow, as our horses are too poor to go along without it. Was obliged to abandon police-horse Brick to-day, as he was completely done up. Nothing but downright poverty is the cause of his giving in; and the same in the case of Fame and Little Padbury, which we abandoned over a month ago. They were poor when they left, and have only had very

dry grass ever since. It is a wonder to me they all do not give in, as many are mere skeletons. Poor old Brick held up as long as he could, but was forced to give in, and we had to leave him to his solitary fate; he will probably go back to the spring (Fort Mueller).

20th (*Thursday*).—Got a very early start and continued on. At one mile found a sandy soak in a gully, and by digging it out got sufficient water for all our horses; and still proceeding and following down a gully for 2 miles came to Mr. Gosse's depôt, No. 13, at Skirmish Hill. A bullock had been killed here and the flesh jerked. Found a large whitegum tree marked $\overset{\text{GOS.}}{13}$ at camp. All the water was gone; I however camped, and took our horses to a place a mile west, where, by digging in the sand, we got enough for them. Went with Pierre to the summit of Skirmish Hill, and took angles. To the south nothing but sand hills and spinifex; to the north-east the Tomkinson Ranges showed up and looked very remarkable and promising.

21st (*Friday*).—Left camp at Skirmish Hill in company with Windich, instructing my brother to follow to-morrow. Found a fine rock-hole 2 miles from camp, and followed along Mr. Gosse's track for 20 miles to the Tomkinson Ranges, over most miserable sandy ridges covered with spinifex. Fine grassy flats along and through the ranges. We left the track to examine a gully to the north, but could not find any water. Got on the track just before dark and followed it along a few miles. Camped without water for our horses on a fine flat of very old grass; Windich's horse completely knocked up, and we had to walk and drive him before us this afternoon. The day was excessively hot, and our horses are very thirsty. We have only about a quart of water for ourselves.

22nd (*Saturday*).—Early this morning we continued on, Windich's horse scarcely able to walk. After about 10 miles found a rock-hole with three gallons of water in it, which we gave to our horses. Followed Mr. Gosse's track to see if there was any water about his depôt, No. 12, but we either missed it or had not reached it. About noon Windich's horse could go no further, and mine was not much better. What was to be done? We nearly finished what water we had with us. The party were coming on to-day, and were depending on us to find water. I determined not to follow the track any further, but to search for water ourselves. Our horses were unable to move; we therefore decided to leave them and go for a search on foot. Windich said he had seen emu tracks, and he thought they were making south; we therefore started on foot. The sun's heat was excessive. About three o'clock returned unsuccessful, and finished what water we had with us. What next to do was the

question; no time was to be lost. Mr. Gosse's map showed some gullies ahead, but whether there was any water in them was questionable; he states "nearly all the waters discovered in the Mann and Tomkinson Ranges were running when left, and from a considerable height." It must have been a good season, and not like this. We decided to go on foot to a gully about 2 miles north, which had whitegums in it. We started off and saw more emu tracks going and coming, also natives' tracks. Windich shot a wurrung, which he said had lately drunk water. When we reached the gully many tracks were seen ascending it, and we felt sure we should find water, and surely enough we soon reached a most splendid spring running down the gully half-a-mile; we were elated and very thankful. Windich got a shot at an emu, but missed it. After having a good drink we went back and got our horses, reaching the spring with them after dark; they were very thirsty and completely done up. Mr. Gosse missed this spring: probably there was water on the flats when he was here, and he did not look much. Although his track is easily followed we had nearly got into serious difficulty by following it. Had we not found this spring our position would be very critical, not having any water for ourselves or horses, and the party in the same predicament. I will be careful not to follow it too far in future, but to trust to our own resources and look for it ourselves. We feel sure we passed water this morning, as in one place we saw emu tracks and pigeons. The party will reach here to-morrow, and I feel very thankful and relieved to have such a fine spring to bring them to. The feed is good a mile down from the spring, although it is very old and dry. There has not been any rain to speak of since Mr. Gosse was here, nearly twelve months ago, as can be seen by the cart-tracks crossing the gullies. I named this spring the Elder Springs after my friend, the Honourable Thomas Elder.

23*rd* (*Sunday*).—Awaited the arrival of the party. Shot an emu, and while skinning it heard a gun-shot and soon after saw Kennedy coming on walking. Found that the party were only half-a-mile off. They had been very distressed for water, and had left 120 lbs. of flour and a pack-saddle 5 miles back, Taylor's mare about 3 miles, and the horse Burges and his saddle 2 miles back. When they saw my note, directing them to the water, they had gone back to bring up Burges, and with great difficulty got him close to camp, when he lay down and they left him. Windich and I started back on foot at once with two buckets of water, and met Burges within a quarter of a mile of camp, crawling along; we gave him the water and he then went on to the spring. We returned and found Taylor's mare and brought her slowly to camp. We are now safe again, and I must give

the horses a few days' rest. The weather has been hot, and if we had not found this spring not more than five horses would have lasted out the day. I will send back and get the flour, as it is only 5 miles off. The party were all very glad to see such a fine spring, as their position was very dangerous, having only 3 gallons of water with them altogether.

26th (*Wednesday*).—Went with Pierre to a high peak, which I named Mount Jane,* about 4 miles S.S.E. from camp, and got a round of angles, and a fine view of the country. To the east, high ranges and grassy flats; but to the south, and from south-east to west, nothing but level country, with a few low rises here and there, apparently sand hills covered with spinifex; most miserable country.

27th (*Thursday*).—Left camp with Tommy Windich to look for water ahead, instructing my brother to follow to-morrow. Steered east for 4 miles, when we struck Mr. Gosse's cart-track. Followed along it a few miles, when we bore more to the north, following the direction of emu tracks, and passed along a fine grassy flat with hundreds of kangaroos in every direction; many emu tracks also. We were sure we were getting close to water. A little further on saw about twenty-five emus, and soon reached a spring in the brook, and camped for dinner. Concluded to remain here the remainder of the day. Went for a walk higher up the brook and found another spring, about 1 mile from the first. Returned and took our horses up to it, as there was better feed there. Left a note, telling the party to camp there also. In a good season these flats must look magnificent; at this time they are very dry, but there is a good deal of old grass on them.

28th (*Friday*).—Continued on eastward, and soon struck Mr. Gosse's cart-track. Followed it along about 7 miles, passing Mount Davis, when we bore more to the south. Following the direction of some natives' tracks, and after going about 2 miles, found a native well in a gully, where water could be procured by digging. Left a note telling my brother to dig it out and see if he could get enough for the horses. We continued on about E.N.E., and soon after shot a kangaroo, and rested an hour for dinner; after which we bore about north-east towards a gully and whitegums, and found it to be Nilens Gully of Mr. Gosse. Found his camp and a whitegum marked with a broad arrow, but no water. We followed along and through the ranges, twisting and turning about, and at last found a number of natives' tracks, making towards a gap, and following

* This is not to be confounded with the Mount Jane of Giles, about 35 miles to the westward.—[ED.]

along them found they led to a gorge, and whitegum gully, ascending which we found water in some little springs. After watering our horses we returned towards the party 3 miles, and camped, intending to bring the party to the spring to-morrow.

29*th* (*Saturday*).—Returned about 5 miles and met the party coming on all right. They reported having met about twenty natives yesterday, who were friendly, and who came up to them, first of all laying down their spears. They had given them damper and a handkerchief. Pierre gave them two kylies. They had three kangaroos roasting in their fire. When we were passing Nilens Gully I saw a native running, and calling Windich, we went over and saw five natives sitting on some rocks watching us. I went towards them, and at first they appeared hostile, but after talking at them and making signs they began to be friendly, and came down close to us. They were all armed with spears. One of them gave me his spear, which was very blunt, and I sharpened it for him. He made signs for me to give him the knife, but I could not, as we were very short of knives. They were afraid at first when I showed them how a horse could gallop, but soon were very pleased and laughed heartily. Windich shot a chockalot and gave it to them. They were amazed at seeing the bird drop, and were very pleased when it was given to them, as they much prize the feathers of these birds. After this we left them and continued on to the spring found yesterday, and camped. Got plenty of water by digging a few holes in the springy places.

30*th* (*Sunday*).—In the afternoon Windich found a fine spring in a gully about half-a-mile north of camp, at which he shot an emu. I named these springs the Crowther Springs (after my friend Mr. Charles Crowther, of Geraldton). Emus and kangaroos very numerous in these ranges.

31*st* (*Monday*).—Got an early start and took the horses to the water found by Windich yesterday, where they could help themselves. Steered E.N.E. about, over level country; spinifex generally, studded with desert oaks, with limestone and snail shells on surface for about 20 miles: reached the Mann Ranges. Before we reached the ranges we struck Mr. Gosse's track, and followed it along, and shortly came to a very large and recent encampment of the natives; there must have been a hundred camped here about a week ago. Found two small springs not far off, but not strong enough to water all our horses; but we soon found some fine springy pools in a gully about half-a-mile further on, where Mr. Gosse also had been camped, and marked a tree with a broad arrow. Mr. Gosse's return track leaves his outward track at this spot. I intend following his return track and make in to the Telegraph Line, down the Alberga,

and on to the Peake. There is abundance of water at this place, and I have no doubt it is permanent, as there are four springs within half-a-mile of one another, but three are very small. Took bearings from a very high range close by; Mount Davis, Mount Edwin, and Mount Hardy being visible. The Mann Ranges are very high and rough, and are composed of reddish granite. They are the highest ranges met with since leaving Mount Hale and Mount Gould, on the Murchison.

September 1st (Tuesday).—Continuing about east along the foot of the Mann Ranges for about 15 miles, came to Mr. Gosse's bivouac of October 11th, but could find no water; a well that had been dug in the sand was dry. Followed up the gully about a mile, and found a small spring, and camped. After draining it out found there was no supply, but were fortunate enough to find some large rock-holes with water,—no doubt soakages from the rocks; but they were in an almost inaccessible spot, and it was with great difficulty we managed to water the horses. One horse fell and nearly lost his life. Country passed over to-day was poorly grassed, and spinifex patches here and there. Large and recent native encampments seen in two places to-day.

2nd (Wednesday).—Followed along south side of Mann Ranges, over country pretty well grassed for about 16 miles, and reached Mr. Gosse's bivouac of October 12th. Found a little water in a sandy hole, and a small spring about half-a-mile higher up the gully. We had to carry the water from the spring in drums, which was slow and hard work. When we had watered half of the horses Windich came, having found large pools of water in a large rocky gully about a mile west; we therefore packed up again and went over to the water. It was a very rough and rocky gully, and the horses had hard work in getting up to it; but there was abundance when they reached it. Pools of water, rock bottom; in fact, rock reservoirs, and fed by springs. It was nearly night when we had finished watering. Windich shot four ducks.

3rd (Thursday).—Got a late start, owing to the horses rambling; we continued on easterly and reached Day's Gully, Mr. Gosse's No. 15 depôt. The water was all gone, and we had to go on. Followed his track along 2 miles, when Windich and I went in search of water, the party waiting our return. After searching a gully to the west without success, we went east to a bare granite hill, and passing through a gorge emerged into a small flat, and saw about 100 natives, all sitting down eating kangaroos. As soon as they saw us they all rose and shouted, and many ran towards us with their spears. One spear came close to me, and stuck fast in the ground. Windich

and I fired our revolvers at them several times, and chased them up the hill. After this they appeared more friendly, and some came towards us and followed us back towards the party, keeping about 200 yards behind. We reached the party and went back to the natives; they were perched all over the hills, over twenty being on one rock. They were friendly now, and about thirty came to us and talked away and seem very pleased. They were much afraid of the horses, and would not come near them. We made them understand we wanted water, and about forty conducted us to a rock-hole with about 50 gallons in it, which we gave the horses. They laughed heartily when they saw us watering the horses, but much more when we hit them to drive them away. They were delighted to see Windich and Pierre were black, and marked about the body, and also at Pierre having his nose bored. They would not come with us further, and pointed towards water westward, but we would not follow their direction, and continuing on easterly, camped without water, and only very old dried grass for our horses.

We were obliged to abandon the mare supplied by Mr. John Taylor to-day, together with about 150 lbs. of flour, and pack-saddle, &c. She is very near foaling, and is very weak; she has carried only the empty bags for some time, and has been gradually failing; she is a fine mare, and I am sorry to lose her, but we cannot help it. We have more flour than we require, so I decided to leave 150 lbs., as our horses are not able to carry it easily. We have over 3 cwt. still, which will be quite sufficient. To-morrow I intend pushing on to try and reach the spring in the Musgrave Ranges shown on Mr. Gosse's chart. It is about 40 miles from here, and I have no doubt the horses will go there, although they are very weak. The natives met to-day were all circumcised, and had long hair and beards, which were all clotted and in strands. The strands were covered with grease and dirt for 6 inches from the end, and looked like greased rope; it was as hard as rope, and dangled about their necks, looking most disgustingly filthy. They were generally fine-looking fellows; and natives are very numerous in this country, as fires and camps are seen in many places, besides well-beaten tracks. Pierre dropped his powder-flask, and one of them picked it up and gave it to him. They were very friendly and pleased, and I think, after the first surprise at seeing us, only a few were hostile. They were much amused at my watch ticking, and all wanted to put their ear to hear it.

4th (Friday).—The horses would not feed last night, and had to be watched: at 4 o'clock we got up and collected them, and got under weigh by half-past 5 o'clock, following on towards the

Musgrave Ranges. The morning was cool, and the horses went along very well. After travelling about 20 miles Padbury and Butcher began to show signs of giving in. We still pushed on, in hope of finding water in Lungley's Gully; the sun shone out very hot in the afternoon. Passed a remarkable high peak, which I named Mount Mary. My brother, Sweeney, and Pierre were behind with the knocked-up horses, trying to get them along. Windich went on Hosken, the only horse that was strong enough, to the north to scour some valleys. Kennedy and I pushed along slowly with the main lot of horses. If we halted a minute many of the horses laid down, and we had great difficulty in getting them up again. After travelling about 31 miles we reached a gully which I supposed was Lungley's, and I left Kennedy with the horses while I ascended it on foot. I soon saw many emu tracks ascending it, and was positive water was a little higher up. Found Windich was about 100 yards in advance of me, having crossed over into the same gully. I soon heard him shout that there was abundance of water, and fired the welcome gun-shots to acquaint the party. Returned, and after lifting up some of the horses that had laid down, and met my brother with the knocked-up ones, we all proceeded up to the water, which we found to be a beautiful spring running down the gully about 30 chains. We were all rejoiced at this good fortune, as we never wanted water more than we did at the present time. Mr. Gosse had camped here, his depôt No. 16, and I wonder he does not show such a fine spring on his map. We are now in perfect safety, and I will give the horses two days' rest.

6th (Sunday).—Took bearings from a hill about a mile east of camp, from which there was a very extensive view. Far as the eye could reach to the south, level plains extended, with low hills rising abruptly out of them here and there; to the west the Deering Hills and the Mann Ranges; while to the east the high Musgrave Ranges soon stopped the view. The whole country is level, and the ranges rise abruptly out of the plains, and is not like the hilly country in the settled districts of Western Australia.

7th (Monday).—Left spring, and steering about east for 7 miles along foot of Musgrave Ranges, when we turned N.N.E. for 4 miles, and east one mile to Mr. Gosse's depôt No. 17, a fine spring in a brook, large whitegums in gully; a very fine spring, but not running; any quantity of water. First rate feed in gully and on flat. Weather cloudy.

8th (Tuesday).—Finished all our meat; we have now only flour to do the remainder of our journey with. As my friend Mr. Gosse did not name this splendid place, I take the liberty

of naming it Gosse's Spring, as that is the name we always gave it in referring to it.

9th (Wednesday).—The horses rambled away last night, and were not collected till late. It was nearly 11 o'clock when we started. We travelled about 14 miles over fine grassy country, and camped on a fine flat with a little water in a gully which appears springy; good feed, although chiefly old, all round camp. One of our horses is very lame, and we have a little trouble in getting him along. It rained a nice shower last night.

10th (Thursday).—Steered N.N.E. for 5 miles, and then north-east and east to Beare's Creek, Mr. Gosse's depôt No. 18, where we found a most beautiful spring running strong down the gully for half-a-mile. I wonder he did not mark it "permanent water" on his map, as it is one of the best springs I have ever seen. Poor place for feed; our horses inclined to ramble. Shot two ducks which were in one of the pools, and two wurrungs, which were very acceptable, being now altogether without meat. Grassy gorge on our route to-day.

11th (Friday).—We got up long before daylight, intending to get an early start and reach Whittell's Creek, but two of the horses were missing, and it was after 8 o'clock when Windich returned with them. We however started, and steering easterly through dense acacia thickets without grass for about 30 miles, we reached the creek, and found plenty of water by digging in the sand. Rough low granite hills all along our route, but very little feed. Passed many clay-pans with water in them. The country was sandy and stony, and is thickly wooded.

12th (Saturday).—Continued onwards about north-east for 10 miles, over saltbush flats with water in clay-pans in places, to the north part of a range (from which I got a view of Mount Connor, which rose abruptly out of the ocean of scrub), rounding which we bore south-east towards Harry's Reservoir, reaching which we camped. It is at the head of a rocky gully, and is very rough to reach, and no feed within 1½ mile of it. There was plenty of water in the hole, which is about 6 feet deep. A whitegum tree close to the pool is marked $\overset{\text{GOS.}}{19}$, and I marked under it, on same tree, $\overset{\text{F}}{90}$, being 90th camp from Geraldton. This being such a rough place, and no feed near, I will move on to-morrow towards or to Fig-tree Gully. Weather dark and cloudy.

13th (Sunday).—Continued on towards Fig-tree Gully, having to go a long way north in order to get round and through the ranges. Most beautifully grassed country all the way; by far the best grassed country we have seen for months. After travelling about 19 miles we found water on some granite rocks,

and camped on a very fine grassy flat. Windich shot a large kangaroo, which was very acceptable.

14*th* (*Monday*).—About 2 o'clock this afternoon we collected the horses and travelled on to Fig-tree Gully about 4 miles, our horses first finishing all the water on the granite rocks. We got enough at Fig-tree Gully to satisfy them, although there is not a great supply. There is a small soakage from the rocks; we filled the drums to-night, so as to have sufficient for them in the morning, as the water does not come in quickly. The view to the east is not very interesting. A few low hills and generally level country—apparently thickly-wooded with Mulga and Acacia.

15*th* (*Tuesday*).—Got an early start, and steering about east for 6 miles crossed the Gum Creek and followed it along about 1½ mile, when we steered more to the east until we struck the head of the Marryatt, which we followed down north-east and east, until we reached the Salt Native well marked on Mr. Gosse's map. We camped here and dug out the well, which was very brackish, but the horses drank it. There was a very poor supply of water, and we kept baling it out into the drums all night and managed to get out about 60 gallons. We travelled about 30 miles to-day, and our horses were very thirsty, it being very hot. I found a small rock water-hole, with about 20 gallons in it, about 1 mile north, to which we will take our horses to-morrow morning.

16*th* (*Wednesday*).—Went over to the rock-hole and gave our horses the water—about one bucket apiece, after which we struck south-east to the river, and found two rock-holes with sufficient water in them to satisfy all our horses. Continued on and reached Mr. Gosse's camp, where he marks on his map "Water-hole dug." Found it quite dry; but after going a few hundred yards we found a nice clay-pan with water in it, and camped. There has been a little rain here a few weeks ago, and it has not all dried up yet; if it was not for the rain-water we would have much difficulty in getting down this river, as all the old native wells dug in the sand are dry.

17*th* (*Thursday*).—Followed down the Marryatt, and at 6 miles passed a native well, which was quite dry. We continued on, and at about 8 miles found a number of rock water-holes, all nearly full of water, about a quarter of a mile south of the river, and camped. Shod some of the horses.

18*th* (*Friday*.)—Two of the horses rambled away during the night and delayed our start. At 8 o'clock we got under weigh and followed along the river. The day was excessively hot, and we had to walk in turns. At 2 o'clock crossed the gum creek shown on Mr. Gosse's map, and searched for the large

clay-pan shown a short distance beyond it; hundreds of natives' tracks seen all along. Towards evening we found a rock water-hole with about 2 gallons in it, which refreshed us, as we were all very thirsty. Here we were obliged to abandon police horse Champion, he being completely knocked up; he has had a very bad back for a long time, and has been running loose without any load. We pushed on, and I sent Windich to look for water. We travelled until 8 o'clock, when we camped for the night without water. Shortly after we had camped, Windich overtook us and reported having found some clay-pans about 6 miles back. After having something to eat I decided to return to the clay-pans, and therefore packed up three of the horses and let the others go loose, leaving the packs until our return. Reached the water by midnight, and the horses finished it all and were not half satisfied. I thought there was more, or would not have come back for it. We hobbled them out and had a few hours' rest.

19*th* (*Saturday*).—Early this morning we searched the flat for water, and found a rock water-hole with about 50 gallons in it, but could not find any more clay-pans. We therefore gave the horses the 50 gallons and pushed on towards "Water near Table Land," shown on Mr. Gosse's map, about 21 miles distant. The day was excessively hot again, and walking was most fatiguing. Men and horses moved along but slowly, but did not give in. Towards noon a hot wind began to blow. Onwards still we pressed, and crossed the large creek coming into the Alberga about 2 miles from the water. I told the party we were now close, and showed them the low table-land just ahead. Before we reached it we found a clay-hole with water, and gave the horses a good drink, after which we moved on a mile and camped at Mr. Gosse's depôt No. 20, where we got plenty of water by digging in the sandy bed of the river. I was very glad to reach here, for the horses were getting very weary, and Sweeney was also done up, and looked very ill and swollen about the head. The walking was most harassing, for besides the ground being soft, the sun was overpowering and excessively hot.

21*st* (*Monday*).—Continued down the Alberga about south-east for about 20 miles, over sandy country thickly wooded with mulga and acacia, to Mr. Gosse's bivouac of December 1st, but there was scarcely any water by digging; we therefore pushed on and found a native well, from which, by digging out about 5 feet, we procured abundance of water. Sweeney still very unwell, unable to walk; others walking in turns, distance 25 miles.

22*nd* (*Tuesday*).—The horses rambled back on the tracks about 3 miles, and it was 8 o'clock before we got started. We

followed down the Alberga over stony plains, poorly grassed and thickly wooded, for about 18 miles. Found sufficient water by digging in the sand; there was only a very poor supply, and it took us a good while to water all the horses. The river-bed is more than a quarter of a mile wide and very shallow, and spreads out over the plains for miles in heavy winters.

23rd (*Wednesday*).—Watering the horses delayed us a little this morning, as there was a very poor supply coming into the well. We followed down the river, and after travelling about 9 miles heard a native shouting, and soon saw him running after us; he was quite friendly, but could not speak any English; he came along with us, and shortly afterwards we found a native well with sufficient water by digging, and camped, as our horses were very weak and required a rest. We finished all our tea and sugar to-day, and have now only flour left; we will therefore have bread and water for the next week, until we reach the Peake. The native ate heartily of damper we gave him, and remained all day and slept at our camp. Distance 10 miles.

24th (*Thursday*).—Travelled on down river, the native still accompanying us, and at about 6 miles met a very old native, and a woman and little girl. They were quite friendly, and showed us water: and the woman and girl came with us to Appatinna, Mr. Gosse's depôt, where we camped at a fine pool of water under right bank of river. Windich shot three emus that were coming to the water, and we all had plenty of them to eat. The natives were very pleased, and went back and brought up the old man and another woman and child. There were now six with us. They have seen the Telegraph Line, as can be seen by signs they make, but they cannot speak English.

25th (*Friday*).—The horses rambled off miles, and it was nearly 10 o'clock before we got under weigh. There was no feed at all for them. We followed down the Alberga for about 15 miles, about east generally, and camped, with very little old dried-up grass for our horses. About half an hour after we left Appatinna this morning we had a very heavy shower of rain, and although it only lasted about a quarter of an hour, it literally flooded the whole country and made it boggy. It was the heaviest thunderstorm I have ever seen. We will have no difficulty in procuring water now all the way to the Telegraph Line, which is not more than 40 miles from here. The natives stayed at Appatinna, as they had too much emu to leave. We did not want them, and were just as well pleased they did not come on. Mr. Gosse's track went N.N.E. to the Hamilton River from Appatinna.

26*th* (*Saturday*).—Got off early and followed down river about 2 miles, when it took a bend to the north, and as it was rather boggy near it we left it and steered about east and E.N.E. for 20 miles over most miserable country without any grass, and camped on a small gully with a little water in it, and some old dry grass in a flat. The horses were very tired, not having had anything to eat for the last two or three days, and some showed signs of giving in; they are all very weak and knocked-up, and we have to handle them very carefully. For the first 13 miles we passed many clay-pans full of water, in fact water everywhere; after which there was very little; and the rain does not appear to have been heavy to the east. The river is about 1½ mile north of us, and we have not seen it for some miles. Hope to reach the Telegraph Line to-morrow.

27*th* (*Sunday*).—Continuing E.N.E. for 2 miles, came to the Alberga, and following along its right bank over many clay-pans with water, about east for 12 miles, and then E.N.E. for 3 miles, and reached the Telegraph Line between Adelaide and Port Darwin, and camped. Long and continued cheers came from our little band as they beheld at last the goal to which we have been travelling for so long. I felt very glad and relieved from anxiety; and on reflecting on the long line of travel we had performed through an uncivilised and unknown country, felt very thankful to that good Providence that had guarded and guided us so safely through it.

The Telegraph Line is very substantially put up, and well wired, and is very creditable at this spot; large poles of bush timber, often very crooked, are used, and iron ones here and there. I gave up keeping watch here, having kept it regularly for the last six months. Marked a tree $\frac{F}{104}$, being 104th camp from Geraldton. We had not much to refresh the inner man with, only damper and water, but we have been used to it now for over a month, and do not feel it so much. The horses are all very tired, and many of them have sore backs. I hope to reach the Peake on Wednesday night, where we will be able to get something to eat. We find making the damper with boiling water makes it much lighter and softer, and is a great improvement.

28*th* (*Monday*).—We travelled down the Telegraph Line for about 21 miles and camped on a branch of the Neales River, with a little grass. Level plains and small rocky rises all the way; very stony country. Many clay-pans with water. A well-beaten road goes along near the Telegraph Line. We did not get on it till we had travelled along the Line about 15 miles. It crosses the Alberga east of the line.

29*th* (*Tuesday*).—When we were nearly ready to start, police

horse Butcher laid down and died in a few seconds; he appeared all right when we brought him in, and was saddled as usual. Old age and continued hard work and continually going, is no doubt the cause of his death; we took off his shoes, and left him where he died. I was sorry for the poor old horse; he had been rather weak for a good while, but had borne up well to the very last. We only had four horses to ride to-day, and Sweeney being still lame only left us three horses between five of us. We travelled down the road for about 33 miles over stony plains; many clay-pans with water in them, but no feed. Camped on a gully with some old feed in the flat, in lat. 27° 49′. Miserable country for feed all day, but plenty of water from recent rains everywhere. Hope to reach the Peake by mid-day to-morrow. Damper and water as usual.

30*th* (*Wednesday*).—Got off early as usual, all in high glee at the prospect of meeting civilised habitations again. Travelled along the road and saw cattle, and shortly afterwards reached the Peake, and rather surprised the people. Mr. Bagot, the owner of the cattle station, was the first I met; and after telling him who we were, he said he had surmised it was so. He soon told us that Mr. Giles had returned, and also Mr. Ross (who had been despatched by the Honourable Thomas Elder with camels and a good equipment to find an overland route to Perth), being unable to get over to Western Australia. Telegraphed to His Excellency Governor Musgrave, informing him of our arrival, and received congratulatory telegrams from him, as well as from the Chief Secretary, the Honourable Arthur Blyth, Mr. Todd (Superintendent of Telegraphs), Baron von Mueller, the editors of the "Register" and "Advertiser," Mr. Ernest Giles the explorer, and several other gentlemen. Felt very thankful and relieved from anxiety, and during my stay at the Peake enjoyed myself very much.

It would be quite out of place, in a report of this nature, to give any lengthened account of all the honours that were bestowed upon us in South Australia, and in this colony on our return. I will therefore give as short an account as possible of our journey from the Peake to Adelaide, and our voyage home. We left the Peake on the 4th October, being assisted with fresh horses and everything we required by the South Australian Government; reached Beltana on the 18th, and the Burra on the 30th, having been most hospitably and kindly treated by every one we met. At Jamestown we were entertained and an address presented, and also at the Burra, Gawler, and Salisbury. We were conveyed from the Burra, with all our equipments, by train to Salisbury, and on November 3rd made our entry

into Adelaide, and were honoured with a public reception, over 20,000 people joining in the procession. In the evening we were entertained at a public banquet, at which about 600 persons were present.

All our expenses from the Burra to Adelaide were paid by the South Australian Government, and during our stay we received every kindness and attention; and I never shall forget the magnificent reception and kind welcome we received in South Australia.

From the 17th to 30th myself and brother were on a visit to Melbourne, where also we received much attention and kindness.

On the 5th December we bade farewell to the hospitable shores of South Australia in the steamship *Nubia*, and reached King George's Sound on the 10th, where we received a hearty welcome and were presented with an address. Again in Bunbury we were honoured by a public reception, and reached Fremantle and Perth on the 14th (at which place we were further honoured with public receptions and were welcomed with much enthusiasm), having been absent 270 days. From almost every town and district in the colony we have received congratulatory addresses, and I am sure I feel very much the honours and kindness that we have received.

CONCLUDING REMARKS.

I now beg to make a few remarks with reference to the character and capability of the country traversed.

The whole of the country, from the settled districts near Champion Bay to the head of the Murchison, is admirably suited for pastoral settlement, and in a very short time will be taken up and stocked (some already has been taken up).

From the head of the Murchison to the 129th meridian, the boundary of our colony, I do not think will ever be settled. Of course there are many grassy patches, such as at Windich Springs, the Weld Springs, all round Mount Moore, and other places; but they are so isolated, and of such small extent, that it would never pay to stock them. From the 129th meridian to the Telegraph Line is a much better country. Many ranges well grassed for most of the way: made travelling much easier. The general character of this immense tract is a gently undulating spinifex desert—*Festuca* (*Triodia*) *irritans*, the spinifex of the desert explorers, but not the spinifex of science. It is lightly wooded with acacia and other small trees, and, except in a few creeks, there is a great absence of any ordinary large timber.

The prevailing rock, which crops out on the rises and often forms low cliffs in which are receptacles for holding water, is *light red sandstone* (desert sandstone, tertiary). The only game found in the spinifex is a kangaroo rat, commonly called the "wirrup;" but in the grassy openings there are many kangaroos, and often emus, also a rat known as the "wurrung;" these animals are very good eating, and formed a valuable addition to our store department. At the permanent waters there were always myriads of bronze-winged pigeons, and also the white cockatoo with scarlet crest, called the "chockalott;" also the "beaccoo," or slate-coloured parrot. Generally, however, with the exception of the crow and hawk, birds were not very numerous except round water. Whenever a sheet of water was found we found ducks, and in Lake Augusta swans and ducks were innumerable.

In bringing this report to a close I need not, I think, refer much to the reasons that induced me to keep more to the south than I originally intended. It will readily be seen, after perusing this journal, that it was a necessity, and that we could not get further north. It is a marvel to me how we ever got through at all: the season was an exceptionally dry one—in fact, a drought; our horses were of a very ordinary kind, and the country most wretched.

When it is remembered that a horse in poor condition and in warm weather cannot go much over a day without water, and when the sterility of the country is considered, it will be readily seen what a disadvantage one labours under without camels, which can go ten days without water. Well can I sympathise with Mr. Giles when he states in his journal, "All I coveted from my brother explorers was their camels, for what is a horse in such a region as this,—he is not physically capable of enduring the terrors of this country." And so it is; horses are the noblest and most useful animals in the world, but they must have food and water regularly. The camel, on the other hand, is physically formed to travel over these desolate regions, and in Australia has been known to go 12 and 14 days without water, carrying 300 lbs. and sometimes 400 lbs. weight.

From these few remarks it will be seen what a great disadvantage Mr. Giles and myself laboured under compared with Major Warburton and Mr. Gosse; and what in similar circumstances might have easily been performed by them was quite impossible with us.

In reading this journal it may be wondered why we followed so much along Mr. Gosse's track, when we might have chosen a new route for ourselves more to the south. The reason is, I had intended, as soon as I reached the 129th meridian (the

boundary of our colony) to make a long trip to the south, nearly to Eucla, and thus map that important locality; but on reaching there I was prevented, for the following reasons:—The weather was excessively warm; the country to the south seemed most uninviting, sand hills as far as could be seen covered with spinifex; our horses were very poor; our rations were running short, the meat and tea and sugar being nearly gone; water was very scarce, and I could clearly see that, although Mr. Gosse had travelled the route last year, it did not follow that we should be able to do it easily this, as all the water thus far where we had camped was gone. I felt we were altogether on our own resources for water, and I concluded to push on towards the Telegraph Line as quickly as possible. As it turned out, although we had considerable difficulty, we reached the Line sooner than I could have anticipated.

I have the very pleasant duty to record my thorough appreciation of the services of my companions. To my brother, Mr. Alexander Forrest, I am especially indebted for his assistance and advice on many occasions, and for his indomitable energy and perseverance. Every service entrusted to him was always carried out: he never disappointed me: when absent for a week I knew to a few minutes when I would meet him. Whether horses or loads had to be abandoned, it mattered not to him, he always carried out the service; and I attribute much of our success to being supported by such an able and hopeful second in command. In addition to this he bestowed great care on the stores of the Expedition, and collected all the botanical specimens, besides taking observations for laying down our route on many occasions during my absence. To Tommy Windich (native) I am much indebted for his services as a bushman, and his experience generally. Accompanying me on many occasions, often in circumstances of difficulty and privation, I ever found him a good honest companion. To James Kennedy, James Sweeney, and Tommy Pierre, I am thankful for the ready obedience and entire confidence they placed in me. They ever conducted themselves in a proper manner, and on no occasion uttered a single murmur.

I take this opportunity of thanking all those gentlemen who so kindly subscribed to the Expedition Fund.

In conclusion, I have to express my sincere thanks to His Excellency Governor Weld for the kindness and support he has given me in this arduous enterprise. I can assuredly say, if it had not been for his zeal and assistance, I would not have been able to undertake and accomplish this Exploration. I have also to thank the Honourable F. P. Barlee, Colonial Secretary, and the Hon. M. Fraser, Commissioner of Crown Lands,

for their kind attention and consideration, and their desire that I should have everything that was necessary to bring the Expedition to a successful termination.

X.—*Travels in Great Tibet, and Trade between Tibet and Bengal.* By C. R. MARKHAM, C.B., F.R.S., Secretary R.G.S.

[*Read*, April 26th, 1875.]

OF all the regions which remain to be explored, and fully brought to the knowledge of geographers, that of Great Tibet is among the least known and the most important. Until to-night no account of this region, derived from the personal observation of an actual traveller, has been submitted to a meeting of this Society, with the single exception of that of the Pundit who was sent by Colonel Montgomerie to Lhasa in 1865. It is indeed to that distinguished officer that we owe all our recent knowledge of Great Tibet; and one of the main objects of the present paper is to furnish some account of two more recent journeys which have been made in Tibet by Colonel Montgomerie's emissaries. But I am also able to bring to your notice the work of two Englishmen who explored portions of Great Tibet many years ago. The results of their labours have remained hidden in forgotten manuscripts until now; and as no European has since followed exactly in their footsteps, and they are consequently still the most recent European explorers of this region, their narratives continue to be as valuable and as interesting as if they had been written this year. The first of these forgotten explorers is Mr. George Bogle, who was sent by Warren Hastings to the Court of the Teshu Lama just a century ago. The second is Mr. Thomas Manning, a private traveller, who reached Tibet in 1812, and is the only Englishman who has ever visited its capital—Lhasa. Bogle and Manning are the only two Englishmen who have ever crossed the Tsampu.

It is necessary that I should first define the limits of the region to which the name of Great or Central Tibet applies. Our general knowledge of that country is still derived from the work of Du Halde and from the old maps of D'Anville, published 130 years ago, and based upon the famous survey of the Chinese Empire undertaken in the reign of Kang-hi, and commenced in 1708. Tibet was surveyed by two Lamas, who had been instructed and trained by Père Regis and other Jesuits at Peking. Their map extended from Sining to the

source of the Ganges, and, when it was delivered into the hands of the Jesuit missionaries at Pekin at 1717, it was found sufficiently accurate and consistent to enable them to construct from it a map of Tibet, from which D'Anville compiled those which still form the basis of modern delineations of the country.

But although the survey of Tibet was executed by native Lamas, the country was visited by Jesuit missionaries in the seventeenth and eighteenth centuries. In 1661 Fathers Grueber and Dorville set out from Peking, and reached Lhasa after a perilous journey of six months, and they eventually crossed a formidable pass into Nepal, and arrived safely at Agra. It is said also, that two other missionaries, named Hippolito Desideri and Manoel Freyre, set out from Goa in 1714, and reached Lhasa two years afterwards. But their narrative, after leaving Ladak, breaks off abruptly. Father Horazio de la Penna, with eleven companions, has, however, a stronger claim to be remembered. He went from Peking to Lhasa in about 1717, at the very time when the Lama surveyors were at work; and, after remaining 30 years in Tibet, he died at Patan in Nepal, in 1747. The results of his labours, including much historical information, were published at Rome by Father Georgi, in 1762, including a Tibetan grammar; and this is the only source from which we derive some knowledge of the succession of the early Kings of Tibet.

It is from these, and less accessible Chinese sources, that Klaproth, Csoma de Körös, Hodgson, and Henry Strachey, were enabled to divide the limits and political divisions, and to give us a general idea of the topography of Tibet.

This most interesting region consists of the elevated plateau in rear of the first great chain of the Himalayas, which overhang the Gangetic Valley; and Central or Great Tibet is that portion which is watered by the Tsampu, or the Brahmaputra in its upper course, and its tributaries. Tibet is divided into four great provinces; namely, *Kam*, or Eastern Tibet, of which we know little or nothing, but which is believed to be cut up into deep gorges by the upper courses of the Yang-tse, the Cambodia, the Salwén, and Irrawadi; *Ari*, or Western Tibet, which has been pretty thoroughly explored by our surveying parties; and the two provinces of *U* and *Tsang*, called *Utsang*, which form Great Tibet. The latter region is bounded on the west by the Marian-la, and the mighty Kailas or Gangdisri Mountain overlooking the sources of the Ganges and the Sutlej; on the south by the outer range of the Himalayas facing the Gangetic Valley, and containing the loftiest peaks in the world; and on the north by another lofty range, called

by Hodgson the *Nyenchhen-thánglá* chain, which separates the country of villages and cultivation from the nomadic hordes on the still loftier plateau of lacustrine drainage between that chain and the Kuen-lun. The eastern boundary of *Utsang*, or Great Tibet, is not so clear. It can be ascertained by a scrutiny of the lists of towns given by Klaproth and D'Anville as situated in the provinces of Tsang and U, and of Kam or Eastern Tibet respectively, and by drawing a line of separation between them. Such a line places the eastern boundary of Great Tibet along the River Kenpu or Dihong, and includes the whole course of the Tsampu or Brahmaputra above the outer Himalayas within it. Great Tibet, or the two provinces of *U* and *Tsang*, thus has an extent of about 750 by 250 miles, and is a region the inhabited parts of which are from 10,000 to 14,000 feet above the sea, bounded by lofty ranges to the north and south, with an inner range traversing it, and separating the watershed of the Ganges from that of the Tsampu. It has thus two systems of drainage. The Tsampu, or Brahmaputra, traverses the whole region from west to east, and receives tributaries from the Nyenchhen-thánglá Range on the north, and the northern slopes of the Himalayan outer and inner chains on the south. The rivers which rise between the inner and outer ranges of the Himalayas either flow, like the Arun (Kosi) and the Lopra-cachu* of D'Anville, through gorges in the outer chain to Bengal into the Tsampu, or into lakes between the two chains.

This grand plateau may in some respects be likened to the Collao of Peru lying between the maritime and eastern cordilleras of the Andes. Both sustain great flocks and herds; and in both a similar ruminant is used as the beasts of burden, the llama in Peru and the sheep in Tibet. In Peru the Lake Titicaca, at 12,000 feet above the sea, is used as a means of communication by a line of steamers; in Tibet the Tsampu is a fluvial highway for merchants and their goods, also at a height of 12,000 feet above the sea; Tibet and the Collao of Peru alike abound in the precious metals, in salt and borax, but Tibet is more difficult of access. On one side the Collao has the maritime cordillera with passes leading to the Pacific coast, on the other the auriferous range of the Eastern Andes overlooking the rich alluvial plains of the Amazon. Great Tibet is more isolated. To the south the mighty range of the outer Himalaya can only be traversed by passes of extreme difficulty, and which are closed by snow during part of the year; while to the north a still more formidable journey over

* Shubanshi, in Assam.

snow-clad plateaux and through fearful mountain gorges, which occupies several months, awaits the traveller who would pass from Tibet to China.

The people of Great Tibet, and their priestly rulers, have a strong claim upon the attention of European inquirers. It is to Chinese exclusive policy, and not to the Tibetans, that our ignorance of their country is due. In former days the intercourse between Bengal and Tibet was frequent and unchecked. The Tibetans are of Chinese race, and their language is allied to Burmese; but their Buddhist religion, their extensive literature, their written character, and their prevailing modes of thought, are all derived from India, and prove that for centuries there must have been an uninterrupted ebb and flow of commerce through the now closed passes of the outer Himalayan range. The monasteries in every part of Tibet, even the most inaccessible, with their armies of monks, the innumerable banners and monuments on every pass, all point to ideas which had their origin and long prevailed in the valley of the Ganges. The belief which forms the basis of Tibetan policy is of Indian origin too, and the Dalai Lama himself is an incarnation, in a certain sense, of a Hindu prince, the holy and sinless Sakyamuni. More strictly he is the incarnate Bodhisattva Padmapani, or Avalokitesvara, the heavenly representative of Sakyamuni. The Dalai Lama is the ruler of the province of U, with his capital at Lhasa; but an equally sacred incarnation rules over the Province of Tsang, namely, the Teshu Lama, whose capital is at Shigatze, and who resides in the adjacent palace of Teshu-lumpo. The Teshu Lama is an incarnation of the great Tibetan reformer Tsonhhapa, who flourished in the fourteenth century. The Tsampu River has been described as the boundary between the two provinces of the Dalai and the Teshu Lamas, U being to the north and Tsang to the south. But this is not exactly correct. Bogle mentions Chan-namling and other towns north of the Tsampu as part of Tsang, while an examination of the lists of towns given by Klaproth and D'Anville shows that several towns reckoned as being within the province of U are south of the great river.

The Lamas say that the intercourse between Bengal and Tibet fell off after the Muhammedan conquests in India; and it was still further interrupted by Chinese interference, and by the turbulent chiefships of Nepal and Bhutan on the outer slopes of the Himalayas. But there was nothing in the state of affairs to prevent a renewal of the old intercourse between Bengal and Tibet, and the establishment of friendly commercial relations, and this was perceived by the great statesman who established and consolidated our Indian Empire. Warren Hastings, the

first Governor-General, and the only one whose name is a household word among the natives of India, lost no opportunity of extending the influence of the East India Company, and improving the condition of the people under his rule. Not the least important of his measures was the re-establishment of direct intercourse with Tibet, on occasion of the mediation of Teshu Lama after the Bhutan War. He resolved to despatch an envoy across the Himalayas, one on whose abilities and discretion he could rely. The great statesman had trained a school of rising administrators, such as Kynynmond Elliot, whose early death in Orissa he so deeply mourned; Clevland of Bagulpur, the first to tame the wild Sonthals, and whose name is still remembered among them; George Bogle, and others of equal mark. The choice of Warren Hastings fell upon the young secretary of the Board of Revenue, George Bogle, who set out for Tibet in company with Dr. Hamilton, an assistant-surgeon on the establishment, and an officer of the Teshu Lama named Paima; and after some detention in Bhutan, the travellers reached Pari-jong. This is at the pass at the head of the Chumbi Valley, which divides Bhutan from Tibet, separating the deep and wild gorges, well wooded and fertile, which slope down to the Bengal plains from the bleak plateau of the Tibetan side. In front were the grassy uplands patched with snow on which no Englishman had ever before set eyes, and on his right towered the sacred peak of Chumulari, 22,944 feet above the sea. Mr. Bogle, accompanied by Dr. Hamilton and their Tibetan companion Paima, set out from Pari-jong, and entered Tibet on the 24th of October, 1774. This mission was politically important, and its results were of great geographical value. I think, therefore, that a brief reference to Mr. Bogle's discoveries, and to some of the incidents of his journey (time will not allow of more), can scarcely fail to be interesting to the Meeting.

Four days after leaving Pari, Mr. Bogle discovered two large Alpine lakes, called Shamtzo and Calutzo (the first is called Ramtchieu by Turner, the second is not named by him), connected with each other by a stream. He also traced the river flowing out of the Calutzo Lake, and found that to be a tributary of the Brahmaputra, and identical with the Penanang-chu. The name of the second lake and the direction of the outlet are entirely new geographical facts. The lakes were half frozen over, and were well stocked with ducks and other wild fowl. Antelopes, *kyang*, and hares were also seen; and it was observed that animal life of all kinds was much more abundant on the bleak uplands of Tibet than in the wooded gorges of Bhutan.

But here a slight difference occurred between Mr. Bogle and his Tibetan friend Paima. The British Envoy was naturally anxious to have some sport, while the Tibetan looked with horror on acts of bloodshed, especially when actually within sight of the sacred peak of Chumulari. Paima strongly objected to shooting, insisting that it was a great crime, that it would give much scandal to the natives, and that it was particularly unlawful within the liberties of Chumulari. Mr. Bogle had many long discussions with him on the subject, and tells us that "they were supported on the side of the Buddhist by plain common-sense reasons drawn from his religion and customs; on the side of the British Envoy by those fine-spun European arguments which serve rather to perplex than to convince." The latter gained nothing in argument; but at length a compromise was arranged. Mr. Bogle agreed not to shoot until they were fairly out of sight of the holy mountain, and Paima consented to suspend his prohibition in solitary and sequestered places.

The march down the Valley of the Penanang-chu and across the inner chain of the Himalayas to the Tibetan towns of Giangtze and Painom has been described by Turner, who followed along the same road a few years afterwards. But Turner never went beyond Teshu-lumpo, while Mr. Bogle crossed the great river Tsampu, near Shigatze, at a point where it is about the width of the Thames at Putney. Having drunk some of its water, washed his hands and feet, and thrown a rupee into it, he embarked in the ferry-boat, of which there were several at this place—well-built, flat-bottomed barges, about 25 feet long, consisting of a flooring of thick planks, and perpendicular sides, about 4 feet high, with an opening at either end, cut down to 2 feet, the whole bound together with bars of iron, and painted white. There was a large oar on each side, pulled by two men, and pushed by another facing them, while a woman helped, by hauling on a line made fast to the end of the blade. The steering is managed by a large oar from the stern. The boat carried over twenty-three persons, seven horses and fourteen asses, besides baggage. The river is not rapid at this place, and great herds of bullocks and flocks of sheep were waiting on each side for a passage. In the summer a lighter kind of boat is used for transporting goods, made of hides, with ribs of willow-poles, about 8 feet long by 4 broad. Mr. Bogle saw many of them on the bank, keel up, and some, with an end raised, serving as habitations for the boatmen.

The flocks of sheep are used as beasts of burden. Some were coming from the wild and desolate country to the north, laden with salt; others were returning from Giangtze with cargoes of

barley. Mr. Bogle describes them as large animals, with horns extending horizontally. He met flocks of 1200 sheep, each carrying two bags of grain weighing from 20 to 25 lbs. They were very obedient to the shepherd's call, and if any of them happened to stray they were easily brought back by the shepherd's dog.

After crossing the Tsampu, Mr. Bogle marched up the valley of the Shiang-chu to Namling, and went thence to a small palace, called Desheripgay, in a gorge a few miles beyond Namling, where the Teshu Lama had resided for two years, owing to the prevalence of small-pox at Shigatze.

The Envoy describes the palace, the retinue, and the ceremonies and receptions with graphic minuteness; and he formed a deep and lasting friendship for the sacred person of the Teshu Lama himself which had a temporarily important influence on British interests, and, if the two men had lived, might have led to permanently good results. The Lama was then about forty years of age. Although endowed with a portion of omniscience and many other divine attributes, his Holiness accommodated himself to the weakness of mortals, and endeavoured to make himself loved rather than feared. The expression of his countenance was smiling and good-humoured, his disposition open, candid, and generous. He was extremely merry and entertaining in conversation, and told a pleasant story with much humour and appropriate action. Mr. Bogle describes the ceremonies of blessing the people, the religious services, and the grand procession from Desheripgay across the Tsampu to Teshu-lumpo, when the Lama returned to his capital. He was on most intimate terms of friendship, not only with his Holiness, but with his young nephews, the Pyn Kushus, and his nieces, the nuns, with whom he had a great deal of laughing and merriment. During a week in March Mr. Bogle and Dr. Hamilton went to a country seat of the Pyn Kushus, on the northern bank of the Tsampu, whence they obtained a magnificent view of the windings of the river and adjacent mountains, and where their hosts exerted themselves to amuse them by hunting-excursions, and to please them by the most cordial hospitality; for the Pyn Kushus made no scruple about shooting when by themselves, and showed Mr. Bogle some good sport with greyhounds, got up matches with bows and matchlocks, and a grand hunt after musk-deer. But they had some fear lest they should get into a scrape with the Teshu Lama if these transgressions were mentioned to him. On the whole, nothing could exceed the cordial friendship which sprang up between Mr. Bogle and the Teshu Lama's family.

When the Envoy finally left Teshu-lumpo on his return to

Bengal, on the 8th of April, 1775, he tells us that he took "his last farewell of the Lama with an aching heart, having become strongly attached to him for his civilities, his bewitching manners, and his amiable character." Nor was this friendship of a fleeting kind. A correspondence was kept up between the two, after Mr. Bogle had returned and was appointed Collector of Rangpur. The letters from the Teshu Lama (one of which is on the table) were written in the curious Tibetan character, on paper made from a species of *Daphne*, which grows in Nepal and Bhutan. At Rangpur Mr. Bogle established a fair, with special immunities and advantages for the Tibetan and Bhutanese merchants, and encouraged the intercourse between Tibet and Bengal by every means that his official position gave him, and with the warm support of the Governor-General.

Unfortunately the good Teshu Lama was induced by the Emperor of China to visit Peking, where he died of small-pox; and in the same year, 1782, Mr. Bogle died at Rangpur. There can be no doubt that the way had been paved for opening the passes into Tibet for traffic and free intercourse. But the premature loss of the negotiators was a death-blow to the bright hopes that were justified by their friendship. Besides his journal and letters, Mr. Bogle drew up valuable reports on the trade of Tibet, on its religion and politics, and on the people. On his death all his papers were packed up and sent to his friends in Scotland, and they have remained untouched and unutilized, in a house in Ayrshire, until the present year. It is true that Warren Hastings did not lose sight of his plans respecting Tibet; he sent a second embassy under Captain Turner in 1783, which reached Teshu-lumpo, following Mr. Bogle's route exactly, but not going beyond that point. The good Lama was then dead, his successor was an infant, and the only result of the mission was the publication of Captain Turner's interesting narrative in 1800.

The death of the Teshu Lama and of Mr. Bogle, and the retirement of the great and enlightened statesman who placed them in communication with each other, were the unfortunate events which put an end to the friendly, commercial, and diplomatic intercourse between the two countries. And there were evil influences of another kind at work. In Mr. Bogle's conversations with the Teshu Lama there is frequent allusion to the turbulent and aggressive policy of the Gorkha Raja of Nepal, and to the hindrances he was placing in the way of commercial transactions between India and Tibet. At last the Nepalese army invaded the province of Tsang, and plundered the monastery of Teshu-lumpo. This led to intervention on the part of China; and in 1792 a great Chinese army marched into Tibet,

utterly defeated the Nepalese at Dingri Maidan, drove them across the Himalaya, and dictated a humiliating peace within 20 miles of Katmandu. From that time the political influence of China in Great Tibet has been paramount; and although the internal administration is not interfered with, Chinese troops remain in occupation, and the exclusion of foreigners is enforced by officially watching the Bhutan, Sikkim, Nepal, and Ladak passes.

It has been said that the watch is so strict as to render it impossible for any Englishman to have passed into Tibet since 1792. But this is not the case, as is proved by the fact, that in 1811 Thomas Manning actually reached the city of Lhasa, although it is true that he is the only Englishman who ever succeeded.

The journey of this adventurous traveller has never been described, and his manuscript narrative has remained unused in the hands of his family ever since. This is the second English traveller to whose labours I desire to call the attention of the Meeting.

Thomas Manning was a mathematical tutor at Cambridge, who, after leaving the University, brooded over the mysterious empire of China, until at last he resolved to undertake a voyage to Canton to study the language, and then to attempt the exploration of the unknown interior. Manning was the friend and correspondent of Charles Lamb, who, during 1803, frequently urged his friend to give up the intended visit to Independent Tartary, as he called it. "The reading of Chaucer has misled you," writes Lamb. "Do not credit his foolish stories about Cambuscan and the ring, and the horse of brass. Believe me, there are no such things. 'Tis all the poet's invention. A horse of brass never flew, and a king's daughter never talked with birds. These are all tales. Pray try and cure yourself. Take hellebore. Pray to avoid the fiend. Read no books of voyages, they are nothing but lies, and O, do not go to Independent Tartary!" But all remonstrances were in vain, and armed with a letter of introduction from Sir Joseph Banks, he sailed for Canton in 1806. After remaining there for some years, studying the language, he proceeded to Calcutta, whence in September, 1811, he set out on his adventurous expedition to Tibet. It would appear that he applied to be employed officially as an Envoy, for when the Chinese authorities at Pari hinted at overtures for opening commerce between Tibet and India, he exclaims, "I cannot help feeling what fools the Company are to give me no commission, no authority, no instructions. Fools to neglect an opportunity they may never have again." Manning was obliged to go as a doctor, and in disguise,

and of course his difficulties were thus multiplied tenfold. Fortunately he encountered a Chinese general on the frontier at Pari-jong, who was civil to him, and with whom he travelled to Lhasa. From Pari to Giangtze he followed the route taken by Bogle and Turner, but there, instead of turning west to Teshu-lumpo, he crossed the inner range of the Himalaya, and reached the famous ring-shaped lake of Palti or Yamdok-chu.

Manning's journal is a personal narrative, containing many incidents of the road, and is especially valuable for its account of Lhasa and of the Dalai Lama; but it contains little geographical information; and if it had not been for the accounts of Bogle, Turner, and the Pundit of 1865, it would not be easy to make out his route. He skirted along the Yamdok Lake for several days, and gives the Chinese name for it as *Haitu* (little sea). But he does not appear to have known the map of D'Anville, or the peculiar form of the lake with its large island as there delineated. He merely says, "from the opposite margin of the lake rose diminutive mountains in a continued chain." He further says that the water of the lake is said to be very unwholesome, and that it is not used for drinking. Manning crossed the Tsampu in a large and good ferry-boat, and reached Lhasa without further adventures. The Dalai Lama was then about seven years old, and the traveller was much impressed by the refined beauty of his Holiness. He had the simple and unaffected manners of a well-educated princely child. His face was poetically, even affectingly, beautiful, and he was of a gay and cheerful disposition; his mouth perpetually unbending into a graceful smile, which illuminated his whole countenance. Mr. Manning's narrative of his stay at Lhasa is full of interest. He intended to have pressed on to China by way either of Sining or Bhatang, but eventually he was obliged to return to India by the road he came, finally leaving Lhasa on the 19th of April, 1812.

Thomas Manning was the last Englishman who ever entered Great Tibet; and only two Europeans have since been at Lhasa, namely the Abbé Huc and Gabet in 1846. Manning's journey shows that, even after the Chinese campaign of 1792, Europeans could pass from Bengal, through Bhutan, to Lhasa; and that the difficulty of recovering the ground gained by Warren Hastings and Bogle is not insuperable. But since 1812 the work has been confined to enquiries and to visiting the heads of passes—so far as Englishmen are concerned. Csoma de Körös did much valuable service in this way. Mr. Hodgson, during his long residence at Kathmandu, collected a mass of information respecting the geography, ethnology, trades, lan-

guages, and literature of Tibet. Captain Pemberton, during his mission to Bhutan in 1838, and Mr. Eden, in 1864, made further additions to our knowledge, which has been still more recently extended by the investigations of Mr. Edgar. But the list of those who have actually reached the head of the passes leading to that forbidden land, which was formerly explored by Bogle, Turner, and Manning, is very brief. First among them are Dr. Hooker, the President of the Royal Society, and the late Dr. Campbell, who reached the Donkia and Kongra-lama passes (18,500 feet above the sea), leading from the head of the Tista Valley in Sikkim, to Tibet, in 1849. Dr. Hooker also visited two passes leading from Nepal. In 1870 Captain Chamer went as far as the Donkia Pass; and in 1871, our associate, Mr. W. J. Blanford, accompanied by Captain Elwes, explored the passes leading from Sikkim to the Chumbi Valley, and visited those of Donkia and Kongra-lama, leading to Tibet. But no one, since the return of Manning in 1812, has ever reached Pari-jong, at the head of the Chumbi Valley, the pass most used and most practicable, and by which all the three English explorers entered Tibet.

This total cessation of intercourse, either diplomatic or through English travellers, gives the arrangements of Colonel Montgomerie for exploring Tibet, by the agency of natives, an importance which can scarcely be over-estimated. Three journeys of Colonel Montgomerie's Tibetan emissaries have been completed, and the results worked out; and one, that of the Pundit of 1865, has already been discussed at one of our Meetings. This explorer traversed the Nepal pass of Kirong, first sighted the Tsampu at Tadum Gumpa, and travelled down its valley to Lhasa. At Talla Lobrong the Pundit found the height of the Tsampu Valley to be 14,187 feet above the sea; at Shigatze, 11,822, so that there is a rapid descent. From Janglache, an important place on the Tsampu (or Narichu) mentioned by Bogle, to Shigatze, a distance of 85 miles, merchants and their goods are conveyed down the river in boats. The Pundit also describes the Yamdok-cho (Palti) Lake, visited by Manning, as being 45 miles round, but only 2 or 3 wide, because it encircles a large island with hills rising 2000 or 3000 feet above its surface, as delineated on D'Anville's map. But the Pundit, in contradiction to Manning, says that the water is sweet. The Pundit was at Lhasa from January to April, 1866, and fixed its height at 11,500 feet above the sea. On his return he traversed the whole length of the valley of the Tsampu from Chusuljong (11,300 feet) to Tadum (14,187 feet), and thence 140 miles higher up to the Marian-la Pass, which separates Tsang from Ari, or Great Tibet from Little Tibet.

Colonel Montgomerie's second Tibetan explorer set out in 1871. He crossed a pass in Eastern Nepal, called Tipta-la (Wallangchoon), which had been visited by Dr. Hooker in 1848, reached the Arun river, a tributary of the Kosi, and after traversing two other passes, discovered a large lake 20 miles long by 16, called Chomtodong, 14,700 feet above the sea; which he mentions as part of the boundary between Sikkim and Tibet. He then crossed the Lagu-lung Pass (16,200 feet) over the inner Himalayan range, and reached Shigatze. All this was new work; but the most interesting part of the journey was that from Shigatze back into Nepal, when he crossed the great plain of Dingri-maidan (13,860 feet), where the Nepalese were defeated by the Chinese army in 1792. Thence he followed a trade-route down the Bhotia Kosi, through a fearful gorge. The road crosses the river no less than 15 times, 3 by iron suspension-bridges, and 11 by wooden bridges, 24 to 60 paces long. At one place the sides of the gigantic chasm were so close that a bridge of 24 paces would span it. Along the perpendicular wall of rock a path is supported on iron pegs let into the face of the rock. The path is of stone slabs covered with earth, only 18 inches wide, a third of a mile long, and 1500 feet above the roaring torrent. Such are the stupendous difficulties which have been overcome in establishing communications between Nepal and Tibet.

The third explorer, a young Tibetan, who had been thoroughly trained for the work, was dispatched by Colonel Montgomerie, in 1871, to explore the unknown regions north of the Tibetan watershed of the upper Brahmaputra or Tsampu. He reached Shigatze in November, and having purchased 50 sheep to carry the baggage, he crossed the Tsampu at the point where Mr. Bogle had been ferried over in 1774, and followed Mr. Bogle's route to Namling, on the right bank of the Shiang-chu river. It is interesting to find that, on more than one point, the long-forgotten journal of Mr. Bogle furnishes evidence of the accuracy of Colonel Montgomerie's explorer. Thus the Chom-gonpa, where, according to the explorer, there are 100 nuns, is in the very spot where Bogle stopped with the Teshu Lama, and was visited by nuns.

The explorer advanced north from Namling with the intention of crossing the range, called by Hodgson the *Ninjin-thanglá*, and of exploring the great Namcho Lake—the Tengri-nor of D'Anville and the Chinese surveyors. The range was crossed by the Khalamba-la Pass, 17,200 feet above the sea, on the 8th of January, 1872. In this mountain-range there are numerous hot-springs and two Geysers, which throw up jets of water to heights exceeding 60 feet. The water, in falling again,

freezes and forms pillars of ice up to the full height of the jet. These pillars are 30 feet in circumference, and the water within them, which is thrown up with great noise and violence, stood at a temperature of 183°, the boiling-point at that elevation being only 183·75°.

The great lake to the north of the mountain-range is called Namcho, or the "shy lake" (Tengri-nor of our maps), and was found to be 50 miles in length by from 16 to 35 miles broad. To the south it is bounded by the *Ninjin-thanglá* Range, consisting of snowy peaks flanked by large glaciers, and culminating in the magnificent peak of *Jáng Ninjin-thanglá*, which is probably more than 25,000 feet above the level of the sea. The range was traced for more than 150 miles, running in a north-easterly direction. To the north of the lake the mountains are not so high. Between the Ninjin-thanglá and the Kuen-lun Ranges the lofty plateaux are inhabited by nomadic tribes and bands of robbers; there is no cultivation, and the monasteries are the only fixed habitations. The drainage is into the salt lakes at the lowest levels of this region, the chief of which is the Namcho or Tengri-nor.

The Namcho Lake is considered sacred; and although at such a very great distance from inhabited districts, and at so great an elevation above the sea, there are several permanent Buddhist monasteries on its banks and on islands, which are visited by large numbers of pilgrims. The lake is 15,500 feet above the level of the sea.

The explorer, making the monastery of Dorkiá, on the western shore, his head-quarters, made the complete circuit of the lake, and found that it had no outlet. The largest influent is the Nai-chu, a very large stream coming from the east, about 40 paces across near the mouth.

After returning to Dorkiá, the explorer once more set out on the 11th of February, 1872, and a few days afterwards he made a short excursion to the northward, and discovered another smaller lake, called Bul-cho.* But on the 18th, as the travellers were about to start, a band of sixty armed robbers arrived on horseback, and, in spite of their entreaties, took away all their clothes and provisions, leaving them nothing but the instruments. After much begging, the robbers gave them back a piece of cloth each, with two sheep and two bags of food, but added, that if they gave any more trouble they would be killed. The explorer had intended to have made his way from the Namcho Lake to China; but after the robbery he was obliged to march as quickly as possible in the direction of

* Bul means borax. It is the chief source of supply for Lhasa.

Lhasa, where they were likely to get into inhabited ground soonest. After suffering many privations, the explorer recrossed the mountains by the Dhok-la Pass, and reached Lhasa on the 9th of March, whence, after a long and difficult journey, he returned to the head-quarters of the Great Trigonometrical Survey. His route-survey extends over 320 miles of a hitherto entirely unknown country; the chief discoveries being the position, size, and elevation of the great Namcho Lake, and the height and direction of the Ninjin-thanglá Range.

Thus, through the labours of these three brave and intelligent native explorers, Colonel Montgomerie has furnished us with exact geographical knowledge respecting three of the passes between Nepal and Tibet—of Kirong, the Nilam-la, and Tipta-la; respecting the whole valley of the Tsampu from the Mariam-la Pass to Chusul-jong; the famous lake of Palti or Yamdok-cho; the position of Lhasa; the great chain forming the northern boundary of the basin of the Upper Brahmaputra; the Namcho Lake, and the interior drainage of Northern Tibet.

This information, combined with the investigations of Hodgson and others, and the personal observations of Bogle, Turner, and Manning enable us to form a sufficiently accurate idea of the trade-routes leading from India to Great Tibet, up the gorges of Bhutan, Sikkim, and Nepal; and of the physical features of the great plateau in rear of the Himalayan ranges.

Commencing from the east, the first trade-route is through the country of the Towang Bhuteas, who are directly subject to Lhasa, down to Udalgori in Assam. Next we are told by Captain Pemberton, who traversed nearly the whole of Bhutan from east to west in 1838, that there are several passes leading from Tibet into the valley of the Manass, the traders finding their way to Dewangiri at the foot of the hills, and afterwards repairing to a great annual fair at Hazu, opposite Gowhatty in Assam. Then comes the pass of Pari-jong, by which Bogle, Turner, and Manning found their way from Bhutan into Tibet, and whence Tibetan traders proceeded by Paro and the Baxa Dicar to the fair established by Mr. Bogle at Rangpur. At Rangpur duties were abolished, and buildings were erected for the convenience of the merchants, as well as of their animals and goods, the annual cost to Government being only 70*l.* The Bhutan caravans arrived in February and March at Rangpur, returning in May and June; merchants were thus attracted to Rangpur in great numbers, and the excellent arrangements for the benefit of trade, which were made by Mr. Bogle, continued for half a century after his untimely death. But Bogle's

arrangements were neglected; and since 1834, when the Government aid was discontinued, the Rangpur trade has almost entirely ceased. At the Assam fairs, gold-dust, salt, musk, cow-tails, woollens, and horses, are exchanged for lac, madder, silk, cloth, and dried fish.

The eastern Sikkim Passes leading into the Chumbi Valley, called Jelep-la, Guatin-la, Yak-la, and Cho-la, have recently been examined by Mr. Blanford and Mr. Edgar. They are rarely interrupted by snow for many days, and form an alternative route to that through Bhutan, up the Chumbi Valley to Pari-jong. Further north is the Tankrala Pass, 16,083 feet above the sea, which is the most snowy pass in Sikkim, and the most difficult of access. The Donkia-la, at the head of the eastern branch of the Tista, is 18,466 feet above the sea, and the Kongra-lama Pass, at the head of the western branch, is lower (15,745 feet). They are used by Tibetan herdsmen, who bring their cattle to graze in Sikkim, and by the people in the upper valley of the Tista branches, the Lachin and Lachung, who twice a year carry wood into Tibet, and bring back loads of salt in return.

The passes from Nepal into Great Tibet follow the tributaries of the Kosi River. The two easternmost were visited by Dr. Hooker, and one, the Tipta-la, was crossed by Colonel Montgomerie's second explorer. The more westerly pass, by the Butia Kosi, was used by the same explorer on his return to India through Nepal. Its appalling difficulties have already been alluded to; and this is not the route adopted by the Chinese Army in 1792, when it advanced upon Katmandu. The easier military pass to the westward is closed to commerce by the Chinese officials. It leads by Jongh-a-jong to Kirong.

Once the intercourse between Bengal and Tibet by means of these passes was frequent, and it should certainly be the aim of our rulers to restore it. The Tibetans have always shown themselves desirous to promote such intercourse, and there is certainly no reason why the policy of permitting the passes to be closed through the jealous and selfish exclusiveness of the Chinese Government should be continued. Bogle enumerated the products of Great Tibet as consisting of gold, musk, cow-tails, wool, and salt. He said that the genius of the Tibetan Government was favourable to commerce, and that no duties were levied on goods, so that, in his time, many foreign merchants had settled in Tibet. Cashmirian traders had establishments at Lhasa and all the principal towns of the country, and the Gosains, or trading pilgrims of India, resorted to Tibet in large numbers. Their trade was confined to articles of great

value and small bulk, and they travelled without ostentation and often by paths unfrequented by other merchants. The Kalmuks annually came to pay their devotions to the Lamas, bringing camels laden with the furs and hides of Siberia. The Bhuteas brought the products of Bengal and Assam; while the Chinese had established themselves in great numbers at Lhasa, and carried on a lucrative trade in the teas, porcelains, and brocades of their native country. The merchants of Bengal and Bahar sent their goods by the passes of Nepal and Bhutan. They consisted of broadcloth, indigo, pearls, coral, chank, spices, tobacco, sugar, white cloths, satins; and the returns were in gold, cow-tails, and musk. It was this trade which Warren Hastings did so much to foster, and which Bogle, as collector of Rangpur, encouraged by the establishment of a fair, and the grant of privileges and immunities.

But all the ground gained by these able administrators in the last century has since been lost. Mr. Edgar, the Deputy Commissioner of Darjiling, tells us a very different story in 1874. Owing to the insecurity of the roads, the trade between China and Tibet is now much less considerable than was formerly the case. The chief article is tea of a coarse description and unpleasant flavour, which sells at Lhasa for eight annas the pound; and so totally have the English neglected the Tibetan markets, that actually Chinese tea is imported through Tibet into the British district of Sikkim for the use of the inhabitants, although tea is grown on the spot. European and Indian goods mainly reach Tibet through Nepal and Ladak, and consist of broadcloth, cottons, corals, pearls, tobacco, opium, and some rich stuffs. The exports from Tibet by these channels are blankets, musk, cow-tails, borax, ponies, gold and silver, but no wool. There is also some local trade with Sikkim and Bhutan. The great wealth of Tibet lies in its flocks and herds; and enormous quantities of wool and ghee might be imported into Bengal at cheap rates, if good practicable passes were once opened. The route proposed by Mr. Edgar is by a bridge across the Tista in Sikkim, and a road thence to the Cho-la Range.

In the present paper I have endeavoured to bring to the notice of the Society the valuable results of the journeys of Mr. Bogle and Mr. Manning, which have only now been brought to light, and to give a brief account of the recent labours and discoveries of Colonel Montgomerie's explorers in Great Tibet. These accounts embrace part of a very important subject, namely, that of the re-establishment of friendly commercial intercourse between Tibet and Bengal, a subject which will most assuredly receive attention in the near future. One thing is certain, that any steps that may be taken to open diplomatic intercourse

with the Teshu and Dalai Lamas, or to promote trade through the Himalayan Passes, cannot fail to add to our stock of geographical knowledge.

XI.—*Narrative of an Exploration of the Namcho, or Tengri Núr Lake, in Great Tibet, made by a Native Explorer, during* 1871-2. Drawn up by Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., &c., Deputy-Superintendent G. T. Survey of India.*

DURING 1871 a party was organised with a view to exploring some portion of the unknown regions north of the Tibetan watershed of the upper Brahmaputra. The party consisted of a semi-Tibetan, a young man who had been thoroughly trained for the work, with four reliable assistants engaged from border districts; one of these latter had been employed on a former exploration in a subordinate capacity, and his experience, as far as travelling in such countries was concerned, would have been exceedingly useful, but unfortunately he was unable to get more than a march beyond the frontier, because the officials on the other side of the Himalayas were determined to arrest him if he proceeded further, though his ostensive object was trade. This being the case, there was nothing for it but to arrange for his return, and to substitute another man in his place.* This was managed satisfactorily after some delay.

The exploring party then passed from Kumaon into the Tibetan province of Hundes or Nari-khorsum. At first they got on very well, but towards the end of July, when in the neighbourhood of the Mánsarowar lake, their progress was for some time interrupted by a band of mounted robbers, who had made an incursion from the east; they succeeded in evading the robbers, but had to take a circuitous route by Púrung, instead of going direct to Shigatze from Mánsarowar, as first arranged. The party reached Shigatze on the 24th of November, and remained there twelve days, making inquiries as to the best route to go to the Tengri Núr Lake, and preparing for the journey. Sheep were the only animals likely to stand the journey, as the roads were too stony for yáks, and the country was too cold for donkeys; the explorers consequently purchased fifty sheep, and put all the baggage on their backs. The party left Shigatze on the 6th of December, marching as far as the "Naisáng" village; on the 7th they crossed the great Brahma-

* *Vide* Map, p. 299.

putra (Sangpo or Tsampu) River by means of rafts, and encamped at Peting village, on the left bank of the river. Peting has about thirty houses. The next day they put up at Chua village. Here the explorer exchanged the silver rupees he had with him for gold, which he put into hollow walking-sticks prepared for the purpose. On the 11th of December they reached Dongdot-lo, a village on the right bank of the Shiang Chu, a northern tributary of the Brahmaputra; here they found an official from Shigatze, who rules over Dongdot-lo and the surrounding villages, which are numerous. On the 13th of December they reached Chom, a village of fifty houses, with a Buddhist monastery (Gonpa) on its west. This monastery, or rather nunnery, is occupied by women only, of whom there were about 100. On the 14th they reached Namling, on the right bank of the Shiang Chu River; here there is a large monastery, with about 500 Lámas, all men; the monastery is on a high hill, it is a place of some importance, boasting of an iron bridge over the river, and commanded by a strongly situated fort, which is the residence of the Jongpon, or Governor, with about 500 Tibetan soldiers; Namling itself has about 200 houses, surrounded by gardens, with a small bazaar in the centre. The Sokpo Giájú tribe, who bring salt, trade through this bazaar, which produces all ordinary provisions. The name of Namling is derived from the two Tibetan words "nam," sky, and "ling," garden, the monastery being on a high hill with gardens at its foot. On the 17th of December the party reached Kholam village, on the left bank of the Shiang Chu River, which was crossed by means of the iron bridge; Kholam has about fifty houses, the land round about is very productive. On the 19th they reached Gonkiáng, a village of sixty houses, with a well built monastery on rising ground. In this monastery there are about 100 Lámas, ruled by a Láma of high rank, called Chúringboche, who is very much respected by the people round about.

On the 20th of December the party halted at another monastery, called Rabdan Chuling Gonpa, built about eighty years ago; it is the residence of another high Láma, called Shaptung Ringboche, said to be 100 years of age, who was both the founder and builder of this monastery. The people of the country say that whilst out hunting he heard a voice which told him to put down his gun and go to a certain spot, where he would find unlimited riches buried in the ground, with this he was commanded to build a monastery; he had obeyed the inspiration, and had ever since passed his life in religious duties. "Rabdan" means house, "chu" wisdom, and "ling" garden. The Láma, when the explorer saw him, was evidently a very

old man, his body so small and shrunk that, when sitting, his knees projected a great deal above his head.

From the time the explorer left Namling, on the 14th of December, it was so cold that the mercury of his thermometer did not rise out of the bulb till after nine or ten in the morning. The streams were all hard frozen. The wind, moreover, blew so hard that their tent was torn by it, and they had, consequently, to make a halt of five days in order to repair the damage. On the 26th of December they marched on and reached Gunje; the people of this village said white bears, called "Tik-Dumba," were very common from thence to Namcho Lake, and committed great havoc amongst their cattle.

On the 27th of December he reached Naikor, which has about thirty houses, and some cultivation; beyond Naikor there was no more cultivation, and the only inhabitants are nomadic, going by the name of Dogpá; they graze sheep, goats, and yáks.

On the 28th of December the explorer encamped at Chutang Cháká, where there are some fifteen hot springs, whose water was found to be at a temperature of 166° Fahrenheit, boiling-water at the same place only rising to 186° Fahrenheit. There are eight baths supplied by these springs; the baths were put at some distance from the springs, so as to allow the water to cool sufficiently for bathing. The water has a smell of sulphur. There were a number of Dogpá tents at a short distance from the springs.

From the Brahmaputra River near Shigatze up to these springs the country is called Shiang Lungba, and that to the north Lahú-Lungba.

On the 29th of December the Chapting encamping ground was reached; here there were more Dogpá tents; the road was so slippery with ice that one of the men fell and broke a thermometer. On the 30th of December they arrived at Peting Chuja, near which, on the right bank of the Lahú Chu River, there is a large stony place about 120 paces in length, from which about a dozen columns of hot water issue; these rise to a height of forty or fifty feet, and produce so much steam that the sky is quite darkened with it; the noise, moreover, was so great that they could not hear one another speaking; the water of these jets was found to be 176° Fahrenheit. Similar jets of water were noticed issuing from the middle of the river, shooting up to forty or fifty feet in height, and evidently at much the same temperature as those on land, as they produced clouds of steam, and the river was free from ice for a quarter-of-a-mile below them, though everywhere else;

both above and below, it was hard frozen. The Jáwar Gonpa monastery lies about three miles to the east of these springs. The explorer went to the monastery, which he found had a number of highly ornamented idols, in front of which were arranged a number of petrified stones called Naidhowas; these are in various shapes, such as hands, shells, &c., and are objects of worship as well as the idols. Jáwar is the name the Tibetans have for Suket-Mandi, in the Panjáb hills, north by west of Simla. This, according to a tradition, was given in honour of a daughter of a Rája of Suket-Mandi, who was supposed to have married "Laban," one of the idols.

On the 31st of December the encampment of Sulung Sumdo was reached; here they found some forty tents. On the 1st of January they halted at Sulung, which boasts of fifty Dogpá tents. The Dogpás said there were no regular encampments beyond Sulung, the only people about being thieves on the look-out for plunder, against whom it would be necessary to be on their guard.

On the 2nd of January the explorer reached Naisum Chuja. Chuja, or chusa, means source of hot-water springs. The name is given to the place from the great number of hot springs which there are here on both sides of the Lahú Chu River. The water from these springs is so hot that the river is not frozen for about three miles below them, though everywhere else it was frozen over. On the right bank of the river there are two very remarkable hot springs, which throw up a jet of water over sixty feet in height; the water in falling again freezes and forms pillars of ice, which are nearly up to the full height of the jet. These pillars are about thirty feet in circumference, and look like towers, with holes at the sides just as if they had been made artificially. The water is thrown up with great violence and noise. The thermometer, when put in the water inside the pillars, stood at 183° Fahrenheit, the boiling-point there being only 183°·75.

The party was delayed at Naisum Chuja for three days, owing to one of the men getting sick; it is said to be a great place of worship or pilgrimage. Owing to cloudy weather the explorer was unable to take any astronomical observations.

On the 6th of January they reached Dung Cháká, 15,700 feet above sea level, where there are more hot springs, but not of such high temperature as the last, their water showing only 130° Fahrenheit, while the boiling-point was 183°; about 10 miles to the east there is a lofty snowy peak called Jhomo Gangar, somewhat of the same shape as the Kailás Peak, near the Mánsarowar; it is a noted object of worship, being considered as a female divinity. On the 7th of January they

encamped at the foot of the Khálamba Lá, crossing over on the 8th, the highest part of the pass being 17,200 feet above the sea, and water boiling at 180°. The crossing was very difficult, owing to a heavy fall of snow, which made the descent on the opposite side very dangerous. The only fire that they could make after crossing was from goat's dung, with which they managed to warm up a brew of tea. The next day the explorer returned to the pass, in order to re-observe the boiling-point, not being quite satisfied that the water was properly boiling the first day that they crossed over. He was again troubled with snow, and when he got back to camp was half dead with the intense cold, and did not recover till he had drunk a bowl of hot tea. The encamping place is called Dung Nagu Cháká; there were several hot springs round about, the water in them raising the thermometer to 180°, while boiling-water only raised it two degrees higher.

On the 10th of January they reached Kiang Lá, and on the 11th Dokmar encampment, where the Dogpás generally keep their sheep, goats, &c., during the summer. On the 12th they encamped on a plain, and on the 13th reached the Gháiká camping place, from whence they got a view of a very large lake, which they found was called by the Tibetans Jáng Namcho Chidmo, and supposed to be called Tengri Núr in the Tartar language. A camp of several tents was seen to the east, at a place called Dungche. As a road was seen to branch off from this camp, two of the men were sent in disguise as beggars in order to inquire about the road, and as to why a camp was kept there; they found the camp all but deserted, the only occupants being an old man and a woman, who were seated in one of the tents; the man said the tents belonged to Dogpás, who had concealed all their property, women, children, &c., while the men themselves had armed and gone out to meet a band of robbers, who they had heard intended to plunder them. As to the road, they said it went to Lhásá, by the Ninjinthanglá, to Jáng Hiangpa Chan Gonpa (monastery), and thence by the Tulung Chubu Gonpa (monastery) to Lhásá.

One mile north of Gháiká the road crosses the Gháiká Chu, a large river, which coming from the west flows into the Jáng Namcho Chidmo Lake, about 12 miles east of the road. The river, though very wide, was completely frozen over: in the summer it is said to rise very much.

On the 16th of January, after crossing the Gháiká Chu River, the explorer reached a place called Chákrí, which is surrounded by a ten feet high wall, enclosing a space about 200 paces square. There were several houses of sun-dried

bricks inside the wall, but they were all in ruins; the place was said to have once been the residence of a man of some rank. As a great deal of snow was falling, the explorers were very glad to take advantage of the shelter which the ruins afforded. On the 18th they arrived at Simjam, where they found about seventy Dogpá tents; as robbers were known to be in the vicinity, every tent was guarded by an armed man. The robbers were said to come from a district called Jámaáta De, which lies to the north. Jámaáta De is said not to be under Lhásá, and the inhabitants consequently plunder the Lhásá districts whenever they are in want, as they often are, in consequence of the severity of the climate, which kills off their cattle whenever there is an extra heavy fall of snow. Simjam, being one of the nearest places to these freebooters, has very often been plundered.

The party were detained two days at Simjam owing to heavy snow, and did not start again till the 21st of January, when they marched to Tárá on the shores of the great Namcho Lake which was completely frozen over, and seemed to extend to a great distance eastward. The next day they continued their march along the shores of the great lake, and reached the monastery called Dorkiá Lúgu Dong, situated on a small hill overlooking the lake. "Dor" means a rock, "lúgu," a sheep, "dong," a face; the monastery looking something like a sheep's head.

A chief Láma lives here with some forty ordinary Lámas. The monastery commands a splendid view of the lake and surrounding snowy mountains, which were more especially grand to the south-east.

The lake is a magnificent sheet of water, and near Dorkiá it has the advantage of having an island close at hand which sets off the scenery. The island is about a mile long, and half a mile in breadth; it has a hill about 400 feet high in the centre which is crowned by a temple of the goddess Dorje Phámo. The explorer determined to make a complete survey of the lake. and he consequently deposited his property in the monastery with three of his men, being afraid of robbers; having done this he started off with three other of his men; on the 24th January they reached Ringa Do on the margin of the lake; here there is another island, called Kuhi Ne Dobo, close to the shore, which is about 1½ mile in length by about 1 mile in breadth.

On the 25th they reached Jádor Gonpa (monastery). Here they saw three pyramids or cones of earth, or sun-dried mud, each about 500 feet in circumference, rising to a considerable height. The explorer went under these mounds by an artificial

passage and found that one of them was open in the centre. The people say that they were originally all closed, and that when a certain very devout Láma, who used to worship under one of these mounds, died, he was taken up into heaven through the opening. The Jádor Gonpa has about fifty Lámas. Near the monastery there are a great many fossil stones which are held in veneration; they are called "Naidhowa." The explorer saw a gigantic doorway cut in a rock through which the Lámas say the god Ninjinthanglá passes; its height is about 25 feet. Owing to heavy snow the explorer was detained two days at Jádor.

On the 29th they reached Nángbá Do, which is also on the shore of the lake close to some small hills, which are considered to be sacred. The next day they halted at Lángdang; here they found the Shukpá bush very abundant. On a low hill there is a temple of a god called Chogo Lá. On the 30th they got to Dakmar, and passing Thuígo Sumna shrine they reached Nai Chu Sumna on the 31st. On their way they crossed the Nai Chu, which is a very large stream, being the largest that flows into the lake; it comes from the east. At the time the explorer crossed it was 40 paces in width, and completely frozen over.

On the 1st February the explorer reached the Tashí Doche Gonpa, a monastery which is on a low hill near the lake; it has thirty-five Láma monks. To the south-west of this monastery there are a number of magnificent snowy peaks which are called the Ninjinthanglá peaks. The Lámas say the highest peak is a god, and that he is surrounded by 360 smaller snowy peaks which act as his servants.

To the east of Tashí Doche there is another mass of high peaks called Nuchin Gásá, which appeared to the explorer to rise higher above the Namcho Lake than the Kailás peak does above the Mánsarowar Lake. The whole of these peaks were very imposing as seen from the monastery, which also commands a full view of the whole of the lake. Though the water of the lake is so salt as to be unfit for drinking, it is nevertheless quite frozen over in November, the lake being about 15,200 feet above the sea; when the explorer saw it the surface looked as if it was made of glass; it is said to remain in that state till May, when the ice breaks up with great noise. The lake contains fish, and quantities of small shells are found on the banks. The lake itself is a great resort for pilgrims.

On the 3rd they halted near a small river; on the 4th they reached an open plain at night, and were put to great straits owing to a heavy fall of snow. They had left their tent behind at Dorkiá, and no shelter being available, they had to clear off

the snow and lie on the ground without any fire; they thought the cold would have killed them, but they managed to survive the night; in the morning they found they were well covered with fresh snow. On the 5th they went on to the Gháiká Chu River; it was snowing all the time, and they were forced to camp out again without any fuel or covering, and passed another very miserable night. On the 6th they saw the sun again, and were able to get some fuel and to make themselves tolerably comfortable, but whilst crossing at the side of the lake near a small stream (the Simjam Chu), one of the men fell through the ice, which was covered with snow, and would have been drowned had he not got hold of another man who pulled him out again. The man's clothes froze hard directly he got out, and he was only brought round by means of a fire which they at once lighted.

On the 7th of February they reached the Dorkiá monastery from which they originally started, having been fifteen days in making the circuit of the lake. They halted three days at the monastery, and started off on the 11th, getting that day as far as Ringa Do; on the 13th they reached the Jádor Gonpa before mentioned, and on the 14th Nángbá Do. Here the explorer heard there was a lake called Bul Cho, about six or seven miles to the north; he accordingly climbed a peak in that direction and saw the lake. He estimated it to be about six miles by five. A kind of borax is found by and in the lake: it is called "Bul," and hence the name. This borax is used by the inhabitants of Lhásá and Shigatze as a spice for meat, for tea, and for washing clothes, bathing, &c. It is carried away by the traders in great quantities.

On the 15th they reached Lángdang, on the 16th Dakmar, on the 17th the plain of Cháng Pháng Chujá, where there are several hot springs in which the thermometer rose to 130°. On the 18th as they were about to start, some sixty armed men arrived on horseback and begun plundering their property, and in spite of their entreaties took away everything except the instruments, which they said they did not care to keep in case the authorities should find them on them, and ask how they came into their possession. After a great deal of begging the robbers gave them back a piece of cloth each, with two sheep and two bags of food, a cooking vessel and a wooden cup to each man; with these they had to be contented, the robbers saying if they troubled them any more they would kill them.

The explorer had intended to make his way from the Namcho Lake to the north as far as the city of Sinning, but after the robbery there was no possibility of doing that, and indeed they were so far from habitations that it was a question whether they

could exist, and there was nothing for it but to march as quickly as they could to the south in the direction of Lhásá, where they were likely to get into inhabited ground soonest. The day after the robbery they halted in order to consult as to the best course to follow. On the 20th of February they went as far as the banks of the Nai Chu River; here one of the men got sick, and they were obliged to remain there all the 21st, their food consisted of one pound of flour and hot water, they had moreover nothing to cover themselves with, the robbers having taken the tent, and they were exposed to the snow and wind, which blew very hard.

On the 22nd they reached Dam Niárgan Lá. The explorer says that he had got so weak that he took much shorter paces than he had hitherto done. On the 23rd they ascended the Dam Niárgan Lá Pass. After crossing they decided to kill one of the two sheep, as they had exhausted all their flour; at the same time seeing tents in the neighbourhood all the men went out to beg, and after a long round came back with six pounds of flour, and began to feel more hopeful. On the 25th another man got ill and they were obliged to halt again.

From Dam Niárgan Lá there is said to be a road to Lob Núr, and to Jilling or Sinning. From Dam Niárgan it is about ten days' journey to Nákchukhá, a place that has a bad reputation as to the number of robbers who prey upon travellers; from thence it is about forty-five days' journey to Sokpohuil, which is quite a barren country, infested, however, by robbers; after passing Sokpohuil the inhabitants are more civilized, and are said to be very kind to travellers.

The Lob Núr (? Koko Núr) Lake is in the Sokpohuil territory, and close to it is the town of Kharká. It is about fifteen days' journey from Sokpohuil to Sinning city, where a Chinese Anban, a man of considerable authority, resides. Sinning is described as being very superior to Lhásá, good horses, sheep, &c., are procurable, and the shops are well supplied with silk, woollen articles, carpets, &c.

On the 26th they halted under the Chánú Lá Pass; the country up to this point was called Dam Niárgan. On the 27th they halted at Angchusa, where they noticed six Dogpá tents. On the 28th they reached Láchu Sumna, the extremity of the Bádam district which begins at Chánú Lá.

The Urirong district extends from Láchu Sumna to Dhog Lá. On the 29th they reached Siwalungi Ritu Gonpá (monastery), which has some sixty Láma monks. Here the height was observed by boiling-point, but owing to the loss of his quicksilver, when robbed at Cháng Pháng, the explorer was unable to take latitude observations; he however hoped

that on reaching Lhásá he would be able to borrow sufficient money to enable him to refit and to return to this same place on his way north-east to China.

On the 1st of March he crossed the Dhog Lá Pass, encamping on the other side; the district of Jáng Tálung extends from the Dhog Lá to the Chak Lá Pass. On the 2nd they reached the very large monastery called Jáng Tálung, which has two head Lámas with about a thousand monks. Here they halted during the 3rd in order to rest and examine the monastery; inside they found a large number of images carved in the walls, the whole of these were adorned with gold. The road from Lhásá to Lob Núr (?) and Jilling (Sinning) passes about one mile south of the monastery. The Sinning Kafilas pass by this route with their camels laden with merchandise. On the 4th of March he crossed the Chak Lá Pass, and encamped at its foot on the opposite (south) side, near the village of Lángmo, where they saw the first signs of cultivation that they had met with since the 29th of December. On the 5th they reached Jhokár Churtan; on the 6th Naimár village, which has about twenty houses, surrounded by a number of smaller clusters of houses. On the 7th they reached the monastery of Nehlin Dák; on the 8th, after crossing the Phembu Gong Lá Pass, they halted at Lingbu Jong. The Phembu district ceases at the pass of that name. On the 9th of March the party reached Lhásá; they were excessively glad to get back to a civilised place again, where they would at any rate have no chance of being starved as they were at one time likely to be.

Though the Lhásá people were hospitable enough, the explorer found there was no chance of his being able to borrow sufficient money to enable him to march to Sinning as he had intended; with the greatest difficulty he managed to borrow 150 rupees from a trader who was going to Gartok, but he insisted upon the explorer accompanying him, and in addition took his aneroid barometer and compass as a pledge for the money; the aneroid, which was a large one, he apparently took for a magnificent watch, and at the end of the journey the explorer's messenger who was sent with money to redeem the instruments had some difficulty in recovering them. Having the command of so little money the explorer decided upon returning to India, and after a long and difficult journey reached the headquarters of the Great Trigonometrical Survey in safety.

Memorandum by Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., &c., *on the Results of the above Exploration.*

Amongst other attempts to explore the various countries beyond the borders of British India, I have always borne in mind the necessity to explore the vast regions which lie to the north of the Himalayan Range, from E. long. 83° to E. long. 93°, and I have consequently, from time to time, tried to get more information as to this *terra incognita;* but since the Pundit made his way from Kumaon to Lhásá, I had not till lately succeeded in getting much advance made to the north of his line of explorations, though a good deal was done to the north of the Mánsarowar Lake. One explorer made his way from Rudok, on the Pangkong Lake, to Thok-Jalung, and thence back to the Mánsarowar, passing quite to the east of the great Kailás peak. The same explorer subsequently made his way to Shigatze, but he was unable to penetrate to the north of the main course of the upper Brahmaputra. Though disappointed with this, I continued to try and get an explorer to penetrate into those regions, and after many failures I have at last the satisfaction to be able to report that some progress has been made in exploring to the north of Shigatze and Lhásá.

The preceding narrative gives the details that I was able to gather from the explorer.

As usual the party was troubled at the frontier; but once fairly in Tibetan territory they had no difficulty in making their way down the upper Brahmaputra to Shigatze, at least no difficulty that would not equally have affected ordinary inhabitants of the country. They found no good opportunity of penetrating to the north till they reached Shigatze; there they, as directed, made inquiries about the Tengri Núr Lake. They found that there was a regular route to this lake frequented by traders in borax, salt, &c., and also by pilgrims; they consequently decided to try and make their way there in the character of pilgrims, taking with them a small supply of goods with a view to meeting their wants on the road by barter, the ordinary custom of such pilgrims.

They were told that sheep were the only means of carriage that would answer, and they made their arrangements accordingly, purchasing some of the large, long-legged sheep, with the usual bags for loading. They marched down to the Brahmaputra, crossing that great river by means of rafts: this point was about 11,200 feet above the sea. Ascending the Shiang Chu tributary of the river, the party day by day got into still higher

ground, until they reached the Khálamba Lá Pass, 17,200 feet above the sea, and there, crossing over from the basin of the Brahmaputra, they descended into the basin of the Tengri Núr Lake, which was found to be about 15,200 feet above the sea.

For eight days after leaving the Brahmaputra the explorer marched from village to village, passing many Buddhist monasteries and some nunneries, with numbers of small villages surrounded by a good deal of cultivation. Naikor was the last village with cultivation; northward they were informed they would find nothing except the camps of "Dogpás," as the nomadic people of that part of the country are called; and they were warned to be on their guard against the white bears, which were said to commit havoc amongst the cattle, sheep, &c. The explorer was well acquainted with the brown bear of the Cis-Himalayan districts, and he believed this white bear to be a different animal, and not the brown bear in its winter coat.

During the great part of his journey to the Namcho Lake the explorer found the streams all hard frozen, and he was consequently much struck by the number of hot springs that he met with, and more especially by the great heat of the water coming from them, his thermometer showing it to vary from 130° to 183° Fahrenheit, being generally over 150°, and often within a few degrees of the boiling-point, being in one case 183° when the boiling-point was 183¾°. The water generally had a sulphurous smell, and in many cases was ejected with great noise and violence; in one place the force was sufficient to throw the water up from 40 to 60 feet. These springs in some respects seem to resemble the Geysers of Iceland; in winter they are very remarkable, in consequence of the water when falling being converted into ice, which forms a pillar of ice round each jet. The quantity of warm water which escapes from below must, however, be very considerable, as the streams into which they drain were free from ice for some distance below where the warm water comes in, though everywhere else hard frozen.

The great lake, which at distance was called the Tengri Núr, was found on nearer approach to be called Namcho or Sky-lake (Nam = sky and Cho = lake) from the great altitude at which it is. It proved to be a splendid sheet of water about fifty miles in length, by from sixteen to twenty-five miles in breadth. It receives the water of two considerable rivers, and several minor streams, but has no exit; the water is decidedly bitter, but, owing to intense cold, it freezes readily, and at the time the explorer saw it, it was one continuous sheet of ice.

To the south the lake is bounded by a splendid range of snowy peaks, flanked with large glaciers, culminating in the magnificent peak, Jáng Ninjinthanglá, which is probably more

than 25,000 feet above the sea. The range was traced for nearly 150 miles, running in a north-easterly direction. To the north of the lake the mountains were not, comparatively speaking, high, nor were there any high peaks visible farther north, as far as the explorer could see from a commanding point which he climbed up to. He only saw a succession of rounded hills with moderately flat ground in between them. Immediately north he saw a lake of about six miles in length, which he was told was called Bul Cho from the borax (bul) which is produced there in large quantities, supplying both Lhásá and Shigatze with most of the borax that they require.

The Namcho Lake is considered to be a sacred place like the Mánsarowar Lake, and although at such a very great distance from habitations, and so high above the sea, it boasts of several permanent monasteries, and is visited by large numbers of pilgrims. There are several islands in the lake, two of them large enough for monasteries. At the time the explorer was there the Lámas on the islands kept up their communication with the shore by means of the ice, but he did not hear as to what was done in summer. Fish are said to be abundant, and modern lake shells were found on the shore, as well as fossil shells, which were very numerous, and of all sizes; a few of the smaller ones have been examined by Mr. Oldham, the Superintendent of the Geological Survey. He thinks they are not older than cretaceous, and are probably nummulitic, "none of them actually agree with the Sindh and Panjáb nummulitic fossils yet described, but they come near them; there is a small *Fusus*, two specimens of the upper whorls of a *Vicarya* or *Cerithium*, with a cast of probably the same species, also a cast or internal mould of a *Tapes*." The specimens sent to Mr. Oldham were, however, too few and badly preserved to enable him to give a decided opinion about them; I had unfortunately started for England before I knew this, otherwise I should have sent him larger specimens. The first opportunity will be taken to have them more thoroughly examined, as also the few modern shells that reached me. The Chief Pundit on his first journey remarked on the stone, bones, shells, &c., that he saw in the Lhásá bazaar, where they are sold in great quantities for medicine, charms, &c. The explorer had also noticed them in other parts; and there is very little doubt but that Tibet will prove to be very rich in fossils, and will amply repay the first European that has the luck to penetrate into the country.

The explorer was only able to bring back some of the smaller specimens.

In most places the margin of the lake was utterly desolate, but near Lángdang the Shukpá bush was abundant. In

another place there was a little vegetation near some hot springs.

The explorer's examination of the lake was unfortunately brought to a sudden close by a band of robbers from Jámaáta De, the district north of the lake. These robbers stripped the party so completely that they were forced to make their way to Lhásá as fast as they could. They were very nearly starved to death, and underwent very great hardships before they got there.

In Lhásá they managed to raise a little money by pawning their instruments; the aneroid, which was a large one, proving very serviceable, as it was mistaken for a gigantic watch, and valued accordingly.

The proof of the existence of a great snowy range to the north of the Brahmaputra is interesting, the Himalayan system, even at that distance, say 160 miles from its base in the plains of India, showing no signs of getting lower. The Lámas of the Namcho Lake described the country to the north as being very much the same as that round the lake, and that it was only after advancing some 60 marches farther north-east that there were any signs of a more civilized country. Jámaáta De (De means district), immediately north of the lake, is not under the Lhásá Government. It must be even more elevated than the country about Namcho, as the inhabitants are said to have great difficulty in keeping cattle, losing numbers every few years owing to heavy and continuous falls of snow. The Jámaáta people are a lawless set, and always try to make up for any such losses by robbing their neighbours about Namcho, Simjam, &c., and where cattle thrive better. Lob Núr was said to be 2½ to 3 months' journey north of Namcho. It was not clear from the explorer's account whether this was the Koko Núr Lake or some other lake more to the west. The route ran north from the east end of the Namcho, leaving at a camping-place called Dam Niárgan. From this point Nákchukhá is distant 10 days' journey, and has a very bad reputation as to robbers. From Nákchukhá it is 1½ month's journey to Sokpohuil, over a most barren country, infested by robbers, but owning no regular inhabitants of any kind. Sokpohuil district is said to be not very far from Lob Núr, near which is the town of Kharká, the residence of a great Láma called Jipchun Ringboche, who rules over the Sokpohuil country. Kharká is said to be above 15 days' journey from Jilling or Sinning-fu, the large city near the north-western end of the great wall of China. Jilling was well-known to the people about Namcho, who admit that it is larger even than Lhásá itself.

The great northern road called the Janglam, which runs far

north of the course of the Upper Brahmaputra River, passes by the Namcho or Tengri Núr Lake, and from thence by Shellifuk Lake to Rudok on the Pangkong Lake, east of Leh, the capital of Ladák. The route followed by the explorer from Dam Niárgan to Lhásá is the route by which Messrs. Huc and Gabet must have approached that city. The explorer thought he would have been able to make his way along it by the Koko Núr, and thence through Sinning-fu, to China if he had the necessary funds. Another attempt will, if possible, be made to do this, as even the slight amount of information gained respecting it is encouraging, and it would be a great thing to get a route survey between Lhásá and Sinning-fu, so as to connect our Indian Trans-Himalayan Explorations with a place that has been fixed by the regular survey operations of the French Jesuit Missionaries.

The route survey extends over 320 miles of what has hitherto been veritable *terra incognita*. Latitude observations were taken at 10 places, and heights, by observations of the boiling-point and of the aneroid, at 24 places. The geography of an area of about 12,000 square miles has been elucidated, and one northern tributary of the Upper Brahmaputra has been thoroughly explored, thus giving us some idea as to how far back the northern watershed of this great river lies.

The Namcho is evidently the lake referred to in old maps as the Tengri Núr. The explorer actually went round it and found that it had no outlet, though fed by two large and a number of minor streams.

The length of the explorer's pace has as usual been computed by means of the differences of observed latitude, &c., and was found to be very fairly accordant on different sections.

The difference of longitude between Shigatze and Lhásá, as determined by this route survey, is nine minutes less than that deduced from the Chief Pundit's survey. The latter was, however, a much more direct line, and the value therefore has been retained. The difference being say 9 miles in 320 miles, or about 3 per cent., is a satisfactory proof of general accuracy.

The heights, by observations of the boiling-point, were satisfactory, but those by the aneroid show that the index must have shifted very much; for although agreeing closely with an ordinary mercurial barometer up to 7000 or 8000 feet above the sea, yet in the neighbourhood of Shigatze (at Peting), which was previously known to be about 11,000 feet above the sea, the aneroid observation indicated an altitude of nearly 4800 feet higher. The aneroid observations, on the average, give altitudes 4631 feet higher than those by boiling the thermometer, a most disappointing result, the aneroid being one that was carefully

tested under an air-pump at Kew, when it was found to agree at every inch of pressure from the normal height down to 11 inches.

A similar difference was given by another aneroid that was sent up to the Thok-Jalung gold-fields; this was supposed to have arisen from some accidental fault.

Captain Basevi, when employed in the elevated ground in the south and north-east of Ladák, was supplied with a similar aneroid, and noted in his memoranda that the observations taken with it were quite unreliable at great altitudes, as he found that even by gentle tapping on the case the index varied its reading, and was always movable in that way no matter how long he remained at a point.

The only conclusion that can be come to, from the three trials referred to, is that in their present shape aneroid barometers cannot be relied on alone at great elevations until they have actually been tested; and they should always be supplemented with either occasional observations of an ordinary mercurial barometer or of a boiling thermometer, at any rate until some satisfactory proof of their reliability has been given, the errors apparently not showing when the aneroid was at rest, and kept at much the same temperature.

It will be noticed that the explorer actually went along a small portion of the great Brahmaputra river below Shigatze, thus adding to our knowledge of its actual course; no iron suspension bridge was however seen there, such as Turner supposed to exist near Shigatze. The explorer was much struck with the magnificent glaciers to the south of the Namcho, or Tengri Núr Lake, and they will no doubt prove to be very extensive, as the man is a good judge of their size, being well acquainted with Himalayan glaciers near India.

Altogether the explorer has done very good service, and in this first altogether independent expedition has shown a large amount of skill, observation, and determination. I trust hereafter he will still farther distinguish himself.

XII.—*Journey to Shigatze, in Tibet, and Return by Dingri-Maidan into Nepaul, in 1871, by the Native Explorer No.* 9. By Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., &c., Deputy-Superintendent G. T. Survey of India.*

THE native explorer whom I designate as No. 9, for one portion of his work, made his way from Dárjiling, passing through Sik-

* *Vide* Map, p. 299.

kim into Great Tibet; it is not, however, necessary to refer to his journey in detail until he got beyond what Dr. Hooker called the Wallangchoon Pass, as up to that point Dr. Hooker has already given us an admirable description of the country.

The explorer, on trying to pass into Tibet, was, as usual, stopped, and told that he would not be allowed to proceed farther, as he was not known to any one, nor able to give any satisfactory evidence as to his being what he stated. He was consequently rather in despair, but was fortunate enough to ingratiate himself with the chief official of a large Sikkim district whose wife happened to be very ill. I have always made my explorers take a supply of medicines with them, mostly of native kinds, with only a few ordinary European sorts to present to people on their journeys. In the present instance, the explorer had also provided himself with a Hindi translation of a treatise as to using these drugs, and, when he heard of the woman's illness, he offered to give her some medicine if he was allowed to see her and hear as to her sufferings, &c.; his offer was at once accepted, and the explorer having seen her, searched his book until he came across some disease with the same symptoms as she had, and he then boldly prepared the medicines directed and gave them to the woman according to the instructions, and awaited the result in not a little trepidation. In a few days' time the woman became wonderfully better, and eventually a cure was effected, very much to the astonishment of the amateur practitioner. The explorer was treated with marked kindness and hospitality from the day the woman began to improve: he then again urged his request to be allowed to pass into Tibet. The headman said he would be glad to give him permission, but that it would be of no use, as he would be again stopped by another official before he advanced very far, unless he had some one to answer for him. The explorer, however, continued to urge his point, and at last the official said he would himself be his security, and he finally sent one of his own men with the explorer, who passed him through the places where he was likely to be stopped.

The explorer consequently marched on without any further interruption, except the ordinary ones at custom-houses, where his baggage was strictly searched; fortunately his instruments were so well concealed that they were never discovered.

From the Tipta-La—the Wallangchoon Pass of Dr. Hooker, probably so named from the village south of it, which the explorer gives as Wallungsum—he made his way in two marches to Tashirak. The road was a difficult one, the ground north of the pass being very elevated and barren, so that both food and fuel had to be carried on yáks for the use of the party.

The Tipta-La was covered with snow; it is on the watershed of a very high range that runs nearly east and west, forming the boundary between Nepal and Lhása.

Tashirak is a large standing Bhotia encampment on a feeder of the Arun River, which rises in a glacier to the west, and not on the main stream of that river, as was formerly supposed; it is 15,000 feet above the sea. Marching north, the explorer crossed the Nila-La Pass, and, passing a large Láma monastery, reached the Shara village of some 50 houses, which is under a Thánahdár of the Tinki or Tinka district, generally known as Tinkijong after its fort (jong). Here his baggage was very closely searched, and it was only by means of the man sent by the Sikkim official that he was able to advance farther. After many inquiries were made, he got a pass to travel to Shigatze, and, being fairly in Tibet, he was never stopped again. He made his way first to Lámádong, a village of 50 or 60 houses, arriving there on the 4th September. Before reaching this place the explorer had latterly seen no cultivation except that of Indian-corn in small quantities, but at Lámádong itself there was a good deal of wheat and peas, and round about several other villages could be seen equally well cultivated; all these villages were on or near the banks of the great eastern branch of the Arun River, called the Khantongiri River, which comes from the east.

The next day he arrived at another small village with plenty of cultivation, all tending to show that he had again reached a warmer climate, Lámádong being 13,100 feet above the sea.

On the 6th September he crossed the Tinki-La Pass, and after a trying march reached the village of Tashichirang on the bank of the Chomto Dong Lake, which is a fine sheet of water about 20 miles in length by 16 miles in breadth, at an elevation of 14,700 feet above the sea. This lake has never been shown in any map that I am aware of, but we have notice of its existence in itineraries collected by Mr. Hodgson, Dr. Campbell, &c. The explorer found the water very clear and pure, and very good to drink: he and his party used it, and were told that the inhabitants took it in preference to that of the two or three streams which were seen to run into the lake. The explorer was unable to go completely round it, but he could see it fully as he passed along its northern shore, and yet could discover no signs of an outlet; the inhabitants declare that it has none: the sweetness of the water, however, is against there being no outlet, and if so it must be somewhere to the south-east. The lake forms a portion of the boundary between Sikkim and the Lhása territories, the Sikkim territory lying to the east, and that of Lhása to the west of the lake. Several

very high snow-peaks were visible from the lake to the east and south.

On the 7th September he arrived at Nangji, a Sikkim village, which, though it has but 50 houses, boasts of a wonderful number of dogs, the explorer declaring he himself saw at least 200, and was certain that he never met with such a large proportion in a Tibetan village, where they are proverbially numerous.

On the 9th September he reached Chajong (Tatápáni) hot springs, where he took latitude and thermometer observations, the latter making it 15,000 feet above the sea. Four reservoirs, each about 30 feet in circumference and 3 feet deep, have been built to catch the water of these springs, which appeared to be sulphurous, and have a high reputation for their curative properties, being visited by numbers of people. The place swarmed with Tibetan (Hodgsonian) antelope, which are quite tame, being never disturbed, as they are considered to be dedicated to the deity of the hot springs. The next day the party encamped in a ravine, and the day after crossed the Lagulung-La Pass, which has quantities of glacier-ice close down to it, being itself 16,200 feet above the sea. This pass forms the boundary between Sikkim and Lhása; the march terminated at the village of Thak. On the 15th September he passed the village and post of Sai-Jong, which is surrounded by cultivation, and has numerous other villages round about; encamped at Chota-Tápu or Darcha village on the banks of the Sai-Jong stream, which comes from a great distance, rising in Sikkim. The next day he crossed the Gyaling Mountains by a pass covered with snow, and reached the Bálu Koti village of 20 houses; this place has a good deal of cultivation, and numerous other villages are visible round about it. Passing thence through a level and well-cultivated country, the explorer reached Shigatze on the 17th of September.

The explorer paid the usual homage to the Láma of Tashi Lumbo, making an offering. of two rupees. He found the city of Shigatze in much the same state as described by the chief Pundit; he, however, heard of the serious rebellion which had been raised against the great Láma of Lhása in April, 1871, during which hundreds of people were killed.

The explorer remained in Shigatze till the 29th of September; he then made his way south-westwards, towards the Dingri Maidán, resuming his route survey on the 30th September from a point he had previously visited. By evening he reached the village of Shimrang, and the next day crossed the Shabki-Chu River, which was 65 paces wide and 4 feet deep, flowing down into the Sang-po (Bráhmáputra); numbers of villages were seen on and off the road. The harvest was being reaped.

On the 2nd October he reached the great Shakia monastery (*Gonpa*), which is only second to that of Tashi Lumbo. The explorer was unfortunately not able to stop at Shakia to examine the place more closely. He says the Shakia monastery is on a low spur; it is inhabited by about 2500 monk Lámás, ruled by a great Láma, called Shakia-Gangma (king, or above all others); he is looked upon as a deity. His Lámás are the only ones in this part of Tibet that are allowed to marry; they are called *Dhukpás*, other Lámás who are not allowed to marry being called *Gálupás*. The town of Shakia lies at the foot of the monastery and is about half the size of the city of Shigatze. About fifty of the shops in the town are kept by Niwars from Nepal; all the other shops are kept by Bhotias. There is a large amount of cultivation around Shakia, though it is about 13,900 feet above the sea.

On the 3rd of October the explorer crossed the Dongo-La, and again got into ground drained by the Arun River, and on the 5th October reached the Chokuar village, on the left bank of the Phungtu or Dingri-Chu River, the great western branch of the Arun River.

Continuing westwards along the Dingri-Chu River, the explorer reached the Sakar-Chu River, a branch of the Dingri-Chu. The Sakar-jong (fort) is about 8 miles north of the junction, and is the residence of a Lhása magistrate. The Ghurkas in 1854 advanced as far as this point when they invaded Tibet.

On the 8th of October the explorer reached the town of Dingri, which is generally known as Dingri Maidán, from the large open plain in which it stands; it is also sometimes called Dingri-Ganga. The town has but 250 houses, supplemented with tents on occasions of fairs, &c.; it is 13,900 feet above the sea.

Five miles above the junction of the Shakar-Chu River, the explorer crossed the Dingri-Chu River by a wooden bridge, seventy-five paces in length—showing that even at that point this great eastern branch of the Arun is a very large stream, as might be expected from its draining the great Dingri tableland.

North, and quite close to the Dingri town, stands the Dingri Khar (fort), on a low isolated hill. A high Chinese officer, called a *Daipon*, who is the chief military and civil officer, resides in the fort; he has a small garrison of Bhotia soldiers, with but one gun.

From Dingri there is a very good road which runs north-west to Jong-ka-Jong, and thence by Kirong town to Katmándu. Officials are, however, the only persons who are allowed to

travel by this route, traders and all others taking the one followed by the explorer to Nilam, &c.

The explorer did not make any stay in Dingri, being afraid that he might be cut off from India by an early fall of snow: he accordingly pushed on as fast as he could. At first he passed through a wide all but level tract, and then getting into rougher ground reached the Thung-lung-La on the 10th of October; he found the pass covered with old ice and snow, it being 18,460 feet above the sea.

On the 11th of October he reached the town of Nilam, 13,900 feet above the sea, which has about 250 houses. It is ruled by a couple of *Jongpons*, the Lhása Government sending two there so as to be a check on one another. Nilam being the first Tibetan town on the road from Nepal, is considered to demand extra vigilance, and consequently the explorer and his party were very closely examined and their baggage was carefully searched before they were allowed to go on.

From Shigatze to the Thung-lung-La pass, the explorer had passed through a moderately level tract, though at a very great elevation, but from the Thung-lung-La, where he crossed the Himalayan watershed, he again entered on very rugged ground, much more difficult than even that south of the Tipta-La (or Wallungsum Pass).

Between Nilam and Listi Bhansár he followed the general course of the Bhotia-Kosi River, and though it is but some twenty-five miles direct distance between the two places, the explorer had to cross the Bhotia-Kosi River fifteen times, by means of three iron suspension, and eleven wooden bridges, each of from twenty-four to sixty paces in length. At one place the river ran in a gigantic chasm, the sides of which were so close to one another, that a bridge of twenty-four paces was sufficient to span it. This was just below or south of the village of Choksum. Near this bridge the precipices were so impracticable, that the path had of necessity to be supported on iron pegs let into the face of the rock—the path being formed by bars of iron and slabs of stone stretching from peg to peg, and covered with earth. This extraordinary path is in no place more than eighteen inches, and often not more than nine inches in width, and is carried for more than one-third of a mile (775 paces) along the face of the cliff, at some 1,500 feet above the river, which could be seen roaring below in its narrow bed. The explorer, who has seen much difficult ground in the Himalayas, says he never in his life met with any thing to equal this bit of path. It is, of course, quite impassable for ponies or yáks, and but very few sheep and goats even go by it, though it is constantly passed by men with loads.

There are several other smaller pieces of paths between Nilam and Listi Bhansár which are nearly as bad, but they are fortunately not continuous.

From Listi Bhansár the explorer's route does not call for any special notice, here being much the same as that in any other part of the mountains south of the Himalayan watershed, being rugged in the extreme for a considerable distance, and then becoming easy in the valleys or Dúns. It may, however, be noted that the explorer crossed the Indrawati feeder of the Kosi, which has five small tarns near its source, called Panch Pokri. The source is in the snowy mountains to the west, as shown on the map.

The lower ground, though not at all noteworthy in itself, had never been surveyed in any way previously, the only land marks being the few great peaks in its neighbourhood, that have been fixed from a distance by the Great Trigonometrical Survey, and I consequently consider the survey of it and other portions of the lower ground a very valuable addition to the geography of that part of the mountains.

On reference to the map, it will be seen that by this exploration the position of the great Himalayan watershed has been determined in three different places. In each case it proves to be far behind or north of the lofty peaks that are visible from Hindustán, such as Mount Everest, Kanchinjinga, &c.

The explorer, it will be seen, went completely round Mount Everest, but his route was so hemmed in by great mountains that he never got a view of Mount Everest itself; it seems to have been invariably hidden by the subordinate peaks which are tolerably close to it. Possibly it may have been seen, but never continuously so as to be able to recognise it again, and to fix it by bearings with a moderately long base. The Kanchinjinga and Junnu peaks were, however, seen from the west of Taplang Jong, but only a short base could be secured. The explorer was much impressed by Kanchinjinga; it is known to the natives near Taplang as *Kumbh Karan Langúr*. The people south of the Himalayas, in Nepal, call all snowy mountains *Langúr*, by which they mean the highest points. They call the peaks that have no snow *Banjung*, and the low ground under the said *Banjung* they call *Phedi*. The term Himalayas is not used by uneducated people, who only talk of the snowy mountains as "*Barfáni Langúr*."

Neither the Bhotias nor the Ghurkas seem to have specific names for remarkable peaks; the explorer asked all sorts of people, but with the exception of the case of Kanchinjinga, referred to above, he never got any name for a peak, though in a few cases they gave that of the nearest village.

Several of the other peaks fixed by the explorer were very lofty ones, covered with perpetual snow to a great distance below their summits; those north of Mount Everest and Kanchinjinga are perhaps the most interesting, as being beyond the Himalayan watershed. One to the north of the road, between Shakia and Dingri, the explorer thought was very much loftier than any others.

The explorer's route survey may be said in a rough way to give us a general idea as to how the mountain drainage runs between the Himalayan watershed, north-west of Kirong, and the point where Turner crossed it near Chumalári, up to the Bráhmáputra, or Sang-po River on the north from west of Janglache to Shigatze. The route between Kirong, Jong-ka-Jong, and Dingri Maidán is still a desideratum, as we are in the dark as to the size of the Palgu Cho Lake, which, however, it now appears will lie somewhat to the south of the approximate position which I gave it in my map showing the chief Pundit's route to Lhása.

A glance at the map at once shows what a large river the Arun must be, the area it drains being so very great. It is one of the few Himalayan rivers which has its source beyond the Himalayan range as seen from Hindustán, the others being the Indus, Sutlej, and Karnáli. The length of the eastern and western upper sources is very remarkable, extending on the one side to the north and east of Kanchinjinga, and on the other to the north and west of Mount Everest.

In the route survey made by explorer No. 9, from Dárjiling to Shigatze, and from Shigatze by Shakia, Dingri Maidán, Nilam, &c., to Katmándu, the value of his pace has in the first instance been derived from the differences of latitude between the various places at which star observations for latitude were taken. A mean value of pace, viz.: 2·45 feet, derived from a mean of the values of each section, was adopted, and this mean value was applied to the number of paces, showing the differences of longitude for each section, and the value of the same in degrees and minutes was deduced therefrom in the usual way.

Taking the longitude of Dárjiling at 88° 18′ 41″, as determined by the triangulation of the Great Trigonometrical Survey, and applying the differences of longitude as determined above, the longitude of Shigatze, by Tatápáni, Chota Tápu, &c., vide map, *i.e.*, by the most direct route, would be 88° 46′ 44″.

Taking the longitude of Katmándu at 85° 17′ 45″, and applying the differences of longitude as above, between it and Shigatze, by Nilam, Dingri, Pil, &c., the longitude of Shigatze would be 88° 32′ 45″.

On examining the map, however, it is at once apparent that

the longitude of Shigatze, as determined by a route survey from Dárjiling, is likely to be more reliable than that derived from Katmándu, because the difference of longitude, between Dárjiling and Shigatze, is but 0° 21′, while the difference between Katmándu and Shigatze, is 3° 11′, or in other words the longitude of Shigatze would be very much more affected by an error in the value of the pace in the latter case than in the former. I have consequently decided upon using only the value as determined from Dárjiling.

In my report on the chief Pundit's exploration to Lhása, I explained that the longitude of Shigatze was determined by the route survey which Mr. Turner made during his journey to Shigatze, combined with the route of the Pundit, Shigatze was computed to be in longitude 88° 48′, a very close agreement with the value as determined above independently by explorer No. 9, viz., 88° 47′. It may consequently be concluded that the longitudes of Shigatze and of Lhása, which depends on Shigatze, as given in my first map, are very close approximations, and it is gratifying to find that my reliance on Turner's route survey was not misplaced.

The explorer's work has stood all the usual tests satisfactorily, the average value of his pace, 2·45 feet as determined from the differences in latitude, is about what might be expected from a man of his stature. His latitude observations agree very well *inter se*, considering that he used but a small pocket sextant. His observations at Shigatze give much the same latitude as that derived from the chief Pundit's observations with a large sextant at that and other places.

His heights are the weakest part of his work, as, owing to the larger thermometers originally sent with him having been broken, he was reduced to take his boiling-point observations with a very small thermometer. The heights, however, are probably fair approximations, and give a good general idea of the great elevation of the upper part of his ground.

His bearings to peaks on either side of his road were more numerous than usual, and on the whole he was fairly successful in fixing the more conspicuous.

The exploration with its bearings, &c., opens out the geography of nearly 30,000 square miles of what has hitherto been in many portions *terra incognita* and in others nearly so; the indications on our maps having been of course mostly conjectural. The exploration more especially elucidates the geography of the basin of the Arun or Arun-kosi River, the great eastern feeder, if not the main source of the great Kosi or Kosiki River, which drains the whole of eastern Nepal. The courses of the upper feeders of the Arun have hitherto been a

puzzle to geographers. The explorer's work also defines the course of the great western tributary of the Kosi River, viz., the Bhotia Kosi, of which we had previously no survey.

His route survey is 844 miles in length, of which 550 miles may be said to be over entirely new ground, and the remainder (though close to a line along which one European has travelled) had never been regularly surveyed before.

The explorer took latitude observations at 11 points upon which the work depends, and determined the height of 31 places. His work, I think, will prove a valuable addition to the Trans-Frontier geography of India.

LIST of POSITIONS of the CHIEF PLACES as determined from the ROUTE SURVEY of EXPLORER No. 9 in NEPAL and GREAT TIBET.

	Latitude.		Longitude.		Height.	Remarks.
	°	′	°	′	Feet.	
Dárjiling	27	2	88	19	7,253	From G.T. Survey.
Tatápáni	28	36	88	8	15,025	
Chota-Tápu (or Darcha village)	28	57	88	27	14,558	
Shigatze (Tashilumbo) ..	29	17	88	47	11,822	
Pil	28	37	87	54	13,259	
Dingri-Maidán town ..	28	35	86	40	13,865	
Nilam-Jong (or Kuti) ..	28	9	86	5	13,911	
Katmándu	27	41	85	18	..	From Crawford's to G.T.S. Peaks.
Kabiri River, bank of ..	..	..	87	33	..	No astronomical latitude.
Narharia (Naria)	26	26	86	45	..	
Dhankuta	26	56	87	21	2,927	
Lámádong	27	10	86	52	..	
Amtia on bank of Arun River	27	12	87	12	1,798	

The longitude of Shigatze is derived from Dárjiling by the route survey passing through Tatápáni and Chota-Tápu. In the map accompanying this memorandum, 88° 40′ was assumed to be the longitude, using a mean between the values derived from Katmándu and Shigatze. In future compilations the positions as given on the map, will require to be corrected to those given above.

OBSERVATIONS FOR LATITUDES TAKEN IN NEPAL AND GREAT TIBET BY EXPLORER NO. 9, WITH A POCKET SEXTANT.

No. of Observation.	Astronomical Date.		Watch Time.			Station.	Object.	Double Altitude.			Index Error.	Deduced Latitude.			Mean Latitude.			Remarks.
	1871		H.	M.	S.			°	'	"	' "	°	'	"	°	'	"	
1	September	11	12	0	0	Tatápáni (chajong)	Fomalhaut ..	62	14	30	−1 0	28	35	44				On Meridian.
2	,,	,,	13	0	0	,, ..	β Ceti ..	85	28	30	,,	28	34	52				Ditto.
3	,,	12	12	0	0	,, ..	Fomalhaut ..	62	14	0	,,	28	35	59	28	35	33	Ditto.
4	,,	,,	13	0	0	,, ..	β Ceti ..	85	27	0	,,	28	35	37				Ditto.
5	,,	15	12	0	0	Chota-Tápu ..	Fomalhaut ..	61	32	30	,,	28	56	44	28	56	56	Ditto.
6	,,	,,	13	0	0	,, ..	β Ceti ..	84	44	0	,,	28	57	8				Ditto.
7	,,	28	12	0	0	Shigatze ..	Fomalhaut ..	60	53	30	,,	29	16	14				Ditto.
8	,,	,,	13	0	0	,, ..	β Ceti ..	84	4	0	,,	29	17	7				Ditto.
9	,,	29	12	0	0	,, ..	Polaris ..	61	23	0	,,	29	17	44	29	17	1	Ditto.
10	,,	30	12	0	0	,, ..	,, ..	61	24	0	,,	29	18	16				Ditto.
11	,,	,,	12	0	0	,, ..	Fomalhaut ..	60	54	30	,,	29	15	44				Ditto.
12	October	4	11	0	0	Pil village ..	,, ..	62	15	0	,,	28	35	26	28	37	16	Ditto.
13	,,	,,	12	0	0	,, ..	β Ceti ..	85	20	0	,,	28	39	6				Ditto.
14	,,	7	11	0	0	Dingri-Maidán	Fomalhaut ..	62	18	0	,,	28	33	55	28	34	30	Ditto.
15	,,	,,	12	0	0	,, ..	β Ceti ..	85	28	0	,,	28	35	5				Ditto.

OBSERVATIONS FOR LATITUDES TAKEN IN NEPAL AND GREAT TIBET BY EXPLORER No. 9—*continued.*

No. of Observation.	Astronomical Date.	Watch Time.	Station.	Object.	Double Altitude.	Index Error.	Deduced Latitude.	Mean Latitude.	Remarks.
	1871	H. M. S.			° ′ ″	′ ″	° ′ ″	° ′ ″	
16	October 11	11 0 0	Nilam or Kuti ..	Fomalhaut ..	63 4 0	−1 0	28 10 54	28 9 24	On Meridian.
17	,, ,,	12 0 0	,, ..	β Ceti ..	86 17 0	,,	28 10 34		Ditto.
18	,, ,,	12 0 0	,, ..	Polaris ..	59 1 0	,,	28 6 44		Ditto.
	1872								
19	January 3	11 0 0	Katmándu ..	Orionis Rigel ..	107 50 0	,,	27 44 2	27 43 29	Ditto.
20	,, ,,	12 0 0	,, ..	Sirius ..	91 30 0	,,	27 42 55		Ditto.
21	,, 17	11 0 0	Lámádong ..	Orionis Rigel ..	108 58 0	,,	27 10 1	27 10 11	Ditto.
22	,, ,,	12 0 0	,, ..	Sirius ..	92 35 0	,,	27 10 21		Ditto.
23	,, 22	10 30 0	Amtia village on bank of Arun River ..	Orionis Rigel ..	108 54 0	,,	27 11 59	27 12 25	Ditto.
24	,,	11 30 0	,, ..	Sirius ..	92 30 0	,,	27 12 50		Ditto.
25	,, 29	10 0 0	Dhankuta Bazar	Orionis Rigel ..	109 28 0	,,	26 54 58	26 56 23	Ditto.
26	,, ,,	11 0 0	,, ..	Sirius ..	93 0 0	,,	26 57 48		Ditto.
27	February 7	9 0 0	Naria Bazar ..	Orionis Rigel ..	110 42 0	,,	26 17 56	26 18 21	Ditto.
28	,, ,,	10 0 0	,, ..	Sirius ..	94 18 0	,,	26 18 45		Ditto.

OBSERVATIONS OF THE BOILING-POINT TAKEN IN NEPAL AND GREAT TIBET BY EXPLORER No. 9.

No. of Observation.	Month and Date.		Watch Time.	Station.	Thermometer. No.	Thermometer. Boiling Point.	Thermometer. In Air.	Deduced Height above Sea in feet.	Remarks.
	1871								
1	August	1	8 A.M.	Dárjiling	7	201°·15	64°·25	7,253	West wind.
2	,,	,,	..	Ditto	10	201·5	,,		A point in Dárjiling 7170 feet, by G. T. S.
3	,,	5	7 A.M.	Phalialung Lek	10	195·2	55·2	10,575	No wind and rain.
4	,,	,,	..	Ditto	7	196·0	,,		Ditto.
5	,,	7	6 P.M.	Suria Lek	7	198·0	63·0	9,190	South wind and rain.
6	,,	9	9 A.M.	Bank of Kabiri River	7	211·0	78·0	1,677	West wind.
7	,,	15	8 A.M.	Walungsamgola	10	195·3	60·0	10,564	No wind.
8	,,	,,	..	Ditto	7	196·0	,,		Ditto.
9	,,	16	1 P.M.	Tipta-La	7	187·0	46·0	15,618	No wind.
10	,,	28	10 A.M.	Tashirak Village	7	188·0	47·0	15,025	North wind.
11	September	1	9 A.M.	Shara Village	7	190·0	68·0	13,983	Ditto.
12	,,	4	3 P.M.	Lámádong thanka	7	191·5	67·0	13,071	Ditto.
13	,,	6	7 A.M.	Tashichirang Village at bank of Chomto Dong Lake	7	188·5	48·0	14,734	East wind.

NOTE.—Lek signifies a pass.

OBSERVATIONS OF THE BOILING-POINT TAKEN IN NEPAL AND GREAT TIBET BY EXPLORER No. 9—*continued.*

No. of Observation.	Month and Date.		Watch Time.	Station.	Thermometer.			Deduced Height above Sea in feet.	Remarks.
					No.	Boiling Point.	In Air.		
	1871								
14	September	12	7 A.M.	Tatápáni or Chajong	7	188°·0	47°·0	15,025	East wind.
15	,,	14	11 A.M.	Lagulung-La	7	186·0	44·0	16,201	South wind.
16	,,	15	4 P.M.	Chota Tápu or Darcha Village ..	7	189·0	64·0	14,558	East wind.
17	,,	19	11 A.M.	Shigatze	7	192·0	61·0	11,822	No wind.
18	,,	23	7 A.M.	Ditto	7	192·5	62·0		East wind.
19	October	3	5 P.M.	Shakia near Tachuk	7	190·0	50·0	13,859	South wind.
20	,,	4	7 A.M.	Pil Village	7	191·0	49·5	13,259	Ditto.
21	,,	9	6 A.M.	Dingri Maidán	7	190·0	51·0	13,865	West wind.
22	,,	10	8 A.M.	Thung-lung-La	7	182·0	30·0	18,460	South wind.
23	,,	13	7 A.M.	Nilam or Kuti	7	190 0	57·0	13,911	Ditto.
24	,,	15	5 P.M.	Tata Bhansár	7	205·25	66·0	5,002	No wind.
25	December	7	8 A.M.	Katmándu	7	208·0	..	..	
	1872								
26	January	8	7 A.M.	Tribeni bank of Sun-kosi and Tamba-kosi River	7	..	50·0	..	
27	,,	9	6 A.M.	Hilia Lek	7	206·0	46·0	4,620	West wind.

OBSERVATIONS OF THE BOILING-POINT TAKEN IN NEPAL AND GREAT TIBET BY EXPLORER No. 9—*continued.*

No. of Observation.	Month and Date.		Watch Time.	Station.	Thermometer.			Deduced Height above Sea in feet.	Remarks.
					No.	Boiling Point.	In Air.		
	1872								
28	January	11	10 A.M.	Kanjia Lek	7	206°·0	46°·0	4,620	West wind.
29	,,	17	,,	Kumdia Lek	7	203·0	43·0	6,302	No wind and rain.
30	,,	18	7 A.M.	Lamakhu Village	7	206·0	45·0	4,622	North wind.
31	,,	,,	2 P.M.	Chakuwa Lek	7	202·0	42·0	6,869	Ditto.
32	,,	22	7 A.M.	Amtia V. on bank of Arun River	7	211·0	54·0	1,798	East wind.
33	,,	26	noon	Chuwa Lek	7	..	44·0	..	Data incomplete.
34	,,	28	7 A.M.	Sudab Village	7	208·0	50·0	3,493	South wind.
35	February	1	9 A.M.	Dhankuta Bazar	7	209·0	52·0	2,927	Ditto.
36	,,	3	7 A.M.	Barah chetr	7	..	55·0	..	West wind.
37	,,	7	7 P.M.	Naria Bazar	7	..	55·0	..	South wind.
38	June	19	noon	Masúri G. T. Survey office	7	201·75	75·0	..	Mean of six. Cloudy and calm.
39	August	12	11½ A.M.	Ditto ditto	7	202·00	70·5	..	

NOTE.—The preceding heights above sea-level are computed differentially from height of Masúri Observatory, taken at 6937 feet, to which the observer's boiling-point 201°·83 and temperature 72°·75 have been assumed as corresponding.

ROUTE SURVEY FROM DÁRJILING (Thánah) TO SHIGATZE (Market Place).

No. of Station.	Name of Station.	Bearing to Forward Station		Distance in Paces to Forward Station.	REMARKS.
		°	′		
1	Dárjiling	294	30	13,963	
2	.. ..	275	30	4,152	
3	Kainchalia	334	30	7,279	Thánah.
4	.. ..	285	0	2,350	
5	Hamaphong	281	30	10,340	Village.
6	.. ..	292	0	15,100	
7	Phalialung Lek ..	274	0	2,871	
8	.. ..	240	0	8,100	On boundary between British and Nepal Territories.
9	.. ..	285	0	13,010	
10	Nablang	297	0	9,580	Village.
11	Suriabhanjan ..	320	30	5,425	Hill.
12	Suria Lek	299	0	7,085	,,
13	Shikárpur	290	30	15,140	Village.
14	Kabiri	310	0	4,566	Stream.
15	Phuwa Village ..	311	0	13,850	200 yards from.
16	Taplang Jong ..	17	30	16,807	Village.
17	.. ..	42	0	6,608	
18	.. ..	66	30	3,859	
19	Tabkia Thok ..	35	0	11,150	Village.
20	.. ..	66	0	17,097	
21	Ebangkhola	301	0	7,270	Stream.
22	Tambru	11	0	8,511	River, on bank of.
23	.. ..	18	30	11.800	
24	.. ..	320	0	8,010	
25	.. ..	335	0	18,001	
26	.. ..	360	0	5,938	
27	Tashirak Chu ..	21	0	10,200	Stream, on left bank of.
28	.. ..	345	0	12,100	
29	Nila-La	20	0	9,910	Hill, on top of.
30	Shara	40	30	34,030	Village.
31	.. ..	90	0	4,700	
32	.. ..	65	30	28,530	
33	Tashichirang ..	270	0	2,288	Village.
34	Chomto Dong ..	22	30	2,500	Lake, on bank of.
35	.. ..	67	0	21.225	
36	Nangji	358	0	6,065	Village.
37	Chajong	67	30	5,450	,, Latitude observed.
38	Tinki-La	75	0	6,684	Hill, on top of.
39	.. ..	35	0	20,104	
40	Lagulung-La ..	345	0	11,670	Hill. Boundary of Sikkim and Lhása.
41	.. ..	16	30	18,194	
42	Ruksum	0	0	8,955	Stream, on bank of.
43	.. ..	53	0	7,715	
44	Chota Tápu	26	0	8 010	Village. Latitude observed.
45	Gyaling-La	67	30	5,000	Hill, on top of.
46	.. ..	25	30	6,393	
47	.. ..	35	30	9,600	
48	.. ..	30	0	16,896	
49	.. ..	33	30	12,000	
50	Shigatze	..		..	City. The Market Place. Latitude observed.

FROM CHANGMA (Village near Shigatze) TO KATMÁNDU.

No. of Station.	Name of Station.	Bearing to Forward Station.		Distance in Paces to Forward Station.	REMARKS.
		°	′		
1	Changma	250	30	14,765	Village—10,996 paces from station No. 48, on the line from No. 48 to No. 49 of foregoing numbering.
2	.. ..	252	30	10,850	
3	.. ..	235	0	4,300	
4	Nangla	225	0	15,125	Hill, on top of.
5	Sab-Chu	280	0	1,280	River, on right bank of.
6	Lingbochen	175	0	6,800	Temple.
7	Puksum	235	0	11,383	Stream, on bank of.
8	.. ..	212	0	12,095	
9	Chong-La	266	0	13,790	Hill.
10	.. ..	200	0	2,500	
11	Ata-La	270	30	11,350	Hill.
12	.. ..	194	30	6,500	
13	.. ..	224	30	7,500	
14	Dongo-La	212	0	11,100	Hill.
15	Sinas-Chu	183	30	19,880	Stream, on bank of.
16	Pil Village	206	0	13,300	Latitude observed.
17	.. ..	230	0	9,118	
18	.. ..	215	30	14,712	
19	.. ..	280	0	13,000	
20	Chaiokor	295	30	30,760	Village.
21	Phungtu	267	0	7,600	River, on bank of.
22	,, ...	275	0	6,500	,, ,,
23	,, ...	270	0	10,294	,, ,,
24	.. .. ..	250	0	9,690	
25	.. .. ..	265	0	17,400	
26	Chakor	260	30	25,100	Village.
27	.. ..	279	30	11,235	
28	Dingri Jong	232	0	32,016	Town at entrance to. Latitude observed.
29	.. ..	294	0	6,500	
30	Thungla	269	30	17,181	Hill.
31	.. ..	225	0	8,500	
32	.. ..	204	0	7,870	
33	Palgu	235	30	4,050	Stream, on bank of.
34	,, ..	205	0	5,820	
35	Thakialing	195	30	21,921	Village.
36	Nilam Jong	210	0	4,800	,, Latitude observed.
37	Kosi River	135	0	5,170	On right bank of.
38	,, ..	190	30	3,200	,, ,,
39	,, ..	176	0	3,540	On bridge.
40	Choksum	184	30	2,870	Village.
41	.. ..	195	30	12,197	
42	.. ..	152	0	2,775	
43	.. ..	209	0	13,017	
44	.. ..	207	0	4,045	
45	.. ..	215	0	6,182	
46	Kanglauk	230	0	3,800	Hill, on top of.
47	Listi	252	0	3,325	,,
48	Listi Village ..	190	30	8,725	
49	.. ..	215	0	2,600	

FROM CHANGMA (Village near Shigatze) TO KATMÁNDU—*continued.*

No. of Station.	Name of Station.	Bearing to Forward Station.		Distance in Paces to Forward Station.	REMARKS.
		°	′		
50	Bisinkhar Lek ..	255	30	4,942	
51	.. ..	240	30	5,480	
52	Balcfi	200	0	5,470	Stream, on bank of.
53	.. ..	248	30	3,210	
54	Banspati	241	30	3,600	Village.
55	Choutra	228	30	3,425	,,
56	.. ..	231	30	5,900	
57	Ghetar	271	30	3,360	,,
58	Sipa	241	30	4,065	,,
59	Jherkola	260	30	3,826	Stream, on bank of.
60	Dhankola	271	30	7,100	,, ,,
61	.. ..	251	0	9,310	
62	Chautaria Lek ..	226	0	2,300	Hill, on top of.
63	.. ..	221	30	3,890	
64	.. ..	270	0	5,635	
65	Kalitar	252	30	8,210	Village.
66	Chabeli	225	0	6,170	,,
67	Katmándu	..		..	At Indar Chaok (centre of city).

FROM KATMÁNDU (Asan Tol) TO TAPLANG JONG (Station No. 16 of Route from Dárjiling to Shigatze).

1	Katmándu	112	0	7,575	Asan Tol. Latitude observed on this line, 1025 paces from starting point.
2	Dimi Village ..	110	0	2,250	
3	.. ..	106	0	3,710	
4	.. ..	115	0	6,300	
5	Bist Village	109	0	2,335	
6	Burapa ,, ...	129	0	4,060	
7	.. ..	113	30	5,660	
8	Nabna Lek	126	30	4,700	
9	Dabchia Village ..	122	0	3,230	
10	.. ..	118	30	4,850	
11	.. ..	66	30	2,500	
12	.. ..	123	30	4,415	
13	.. ..	135	30	6,825	
14	.. ..	112	0	5,200	
15	.. ..	110	0	4,910	
16	.. ..	127	0	7,800	
17	Jhangajholi	105	0	4,786	Village.
18	Mulkotar	127	30	6,400	,,
19	.. ..	74	0	2,415	
20	.. ..	144	0	5,500	
21	Tribeni	92	0	7,200	Junction of two streams.
22	Bedana	110	0	3.950	Village.
23	.. ..	100	0	5,700	
24	Hilia Village ..	32	0	3,000	
25	.. ..	35	0	3,500	
26	.. ..	112	0	2,000	

FROM KATMÁNDU (Asan Tol) TO TAPLANG JONG—*continued*.

No. of Station.	Name of Station.	Bearing to Forward Station.		Distance in Paces to Forward Station.	REMARKS.
		°	′		
27	.. ..	60	0	1,900	
28	.. ..	93	0	4,000	
29	.. ..	103	0	6,190	
30	Kuwapáni	72	0	4,770	Village.
31	.. ..	122	30	4,500	
32	.. ..	149	30	3,900	
33	.. ..	107	0	11,000	
34	Kanjia Lek	60	0	6,400	
35	Kanjia Village ..	87	0	6,615	
36	Bungnang	95	0	3,400	
37	Gahatiatar	42	30	2,200	Village.
38	.. ..	126	30	3,715	
39	.. ..	95	0	10,146	
40	Charkhu	74	30	5,870	Village.
41	.. ..	117	30	5,481	
42	Dudh-kosi	55	0	6,225	River, on bank of.
43	Rakola Pasal ..	120	0	9,680	Shop.
44	Kumdia Lek ..	45	0	4,726	
45	.. ..	117	0	6,500	
46	Nerpa Village ..	136	30	5,790	
47	Dorpa ,, ..	85	30	8,500	Latitude observed at Lámádong Village 5600 paces from Dorpa on line from Dorpa to Station 48.
48	Lamakhu	100	0	7,025	Village.
49	Chakuwa Lek ..	77	30	5,900	Hill.
50	Dilpa Village ..	61	30	4,400	
51	.. ..	140	30	10,780	
52	Bhojpur Village ..	82	0	6,597	
53	.. ..	37	0	4,600	
54	.. ..	40	30	5,210	
55	Soria Village ..	57	30	5,425	
56	.. ..	48	0	4,000	Latitude observed on line 56 to 57 at Village Amtia, 2500 paces from Station 56 towards 57.
57	Arun River	74	0	7,290	On bank of.
58	Chainpur Lek ..	55	0	5,700	Hill.
59	,, Village	77	30	8,590	
60	.. ..	92	0	10,610	
61	Nundhakia	65	30	6,400	Pati. Small Bazar and Dharmsála.
62	.. ..	110	0	4,200	
63	Milkia Lek	87	30	4,410	
64	,, ...	70	0	8,625	
65	.. ..	62	30	13,645	
66	Taplang Jong ..	..		..	Same as Station No. 16 of Route from Dárjiling to Shigatze.

FROM KABIRI DHARMSALA (Station No. 14 of Route from Dárjiling to Shigatze) TO NARIA BAZAR (Kotwáli).

No. of Station.	Name of Station.	Bearing to Forward Station.		Distance in Paces to Forward Station.	REMARKS.
		°	′		
1	Kabiri	125	0	3,900	
2	Tamru River ..	199	30	7,310	On left bank of.
3	Chua Pahár	267	30	7,600	
4	Sambua	210	30	5,300	Village.
5	Tukma	135	0	2,700	Hill.
6	.. ..	216	0	7,520	
7	Majhwa	210	0	4,525	
8	.. ..	201	0	9,470	
9	Kalamati	225	0	4,597	Hill.
10	.. ..	172	0	2,000	
11	Sudab Hill	225	0	3,370	
12	.. .. ..	241	0	3,800	
13	Telia khola	201	30	7,820	Stream.
14	Hamjung Hill ..	249	30	8,315	
15	Dhankuta	187	0	6,660	Bazar. Latitude observed.
16	.. ..	246	0	5,670	
17	Tamru River ..	211	0	8,860	On bank of.
18	.. ..	241	30	4,370	
19	Dhárapáni	272	0	6,040	Village.
20	Barah Chetr ..	191	0	8,466	Worshipping place.
21	Chatria	215	0	23,400	Thánah.
22	Megjin	177	0	23,300	Ka Thánah.
23	Chapri Village ..	275	0	4,100	
24	.. ..	206	30	11,476	
25	Kotia Village ..	220	30	8,170	
26	Thakia ,, ..	261	0	5,210	
27	Sikrata ,, ..	251	0	5,676	
28	.. ..	272	0	10,085	
29	Dhánsia Village ..	267	0	6,650	
30	Arálna ,, ..	251	0	4,270	
31	Naria ,, ..	..		..	Bazar, Thánah. Latitude observed.

XIII.—*Extracts from an Explorer's Narrative of his Journey from Pitorágarh, in Kumaon, viâ Jumla to Tadum and back, along the Káli Gandak to British Territory.**

[Communicated by Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., Deputy-Superintendent G. T. Survey of India.]

ON the 1st July, 1873, I started with my survey from Pítorágarh, and on the third day reached Askot. At Askot there resides a man, named Puskar Sing Rajwar, whose people are frequently passing into Nepál, and I went to consult him as to which would be the best place to cross the River Káli, telling him I was a physician on my way to Jumla. I learnt from him that as the rains had set in, the ropes by which the river is crossed were put away, to keep them from rotting, but that if I went to Ráthi, which was higher up the river, I might there have a chance of crossing. I accordingly did so, and reached Ráthi on the 6th. As there was only a rope by which the river is crossed, and men suspend themselves by their hands and feet and bear such loads as are to be carried over on their chests, I had no nerve for it, so had a sling made for myself, and was drawn across in it, and stopped at Bargáon in the Don pattí, in Nepál, on the 7th. Bargáon has 50 houses, and is about the largest-sized village in the pattí.

On the 8th I travelled through a tract but little inhabited and along a difficult road, and halted for the night, without provisions, at a deserted sheep-fold.

On the 9th, after another yet more difficult journey, I arrived at Maikholi (two houses).

On the 10th I reached Shipti village (thirty houses), having crossed the Kotidhar Pass, 5793 feet above the sea, and the River Tatigár on the way. Although Shipti is in the Don pattí, it is usual, on account of its size and importance, to include the villages in its neighbourhood in a pattí, which is called after it.

On the 11th I went to Shiri, in the Marma pattí. The villages of this pattí are all in the valley of the Chamlia River. Cultivation is extensively carried on in it. The villages are situated where the hills have gentle slopes, and the land, which is terraced, is irrigated by small channels from the Chamlia. Fish, which abound in the river, are caught, dried, and stored by the villagers in large quantities, for home consumption: they are eaten by all castes. I here intended crossing the river, but found the ropes broken; I went a couple of miles further up, and found crossing ropes and passed over. The road for the two miles up the river and back to the main road on the oppo-

* *Vide* map, p. 299.

site side was so difficult, that it took me half the day to go over it. Halted at Matiál: formerly a road from Doti to Taglakhar led along the Chamlia through this pattí and by a pass across the Marma snowy range. It was given up a long time back, owing to a dispute with the Taglakhar people. The snowy range is not more than 14 or 15 miles north-east of the river.

On the 13th I marched to Karálá, in the Búngnang pattí. This march consists of a difficult ascent to the Machaunia-lekh Pass, during which no water is to be had, and of a descent. At the summit of the pass the birch and juniper grow, and lower down oak and "ringal" (hill bamboo) and "pangar" (horse-chesnut). The lands of the villages in this pattí are well cultivated. I halted at Karálá, 5326 feet above the sea-level, on the 14th, owing to rain. On the 15th I started, crossing and recrossing the Karálágár till it joins the Sangár, a larger river which comes from the snow, but which is called Karálágár below the junction. I crossed the Sangár stream by a wooden bridge and continued along the left till I came opposite to Batusherá, which is on the right bank of the Karálágár at its junction with the Nabliagár. A road from these parts to Bias goes along the left bank of the Sangár and crosses the snowy range by a high pass.

I procured a pass to Bajangayá from the Thanadar of Batusherá, and by midday on the 15th I got to the Kálágár River, which joins the Karálágár and is crossed by the people of the country by ropes; but slings were at hand for those who, like myself, had no nerves for the ordinary way of crossing. I stopped for the night at Bipur, on the other side of the river. From Karálá the road lies through villages and cultivated land, but no forests.

On the 17th I crossed the Karha Pass and reached Jakhora village. On the ascent to the pass there are two villages, Ranlekh and Kálákáná.

On the 18th I crossed the Kansia Pass and put up for the night at Sain village, in the Bhajangayá pattí. The road was good, not fit for riding but very fair for walking.

On the onward journey and a little short of a mile from Sain, is a temple of masonry, on a well-cultivated and irrigated spot at the junction of the Saingár and Khatiyarigár, both small streams, the former coming from a north-westerly and the latter from a northerly direction. On the road, about ½ a mile further on, is Pujári, a small village of five or six houses, inhabited by Brahmins, the priests of the temple. Crossing Khatiyarigár and another smaller stream of same name, I at midday reached Biasi, a village consisting of ten or twelve houses to the north of Bhajangayá, about ¼ mile. Bhajangayá is an old fort, out of

repair. Biasi is 5390 feet above sea-level, and on a level with Bhajangayá Fort.

The fort was formerly of a circular form and about ¼ of a mile in circumference. It consists of dry stone walls about 10 feet high, with two brick and mud three-storied houses with sloping roofs, formerly the residence of the Rájá and members of his family, built within the enclosure. There are about sixteen houses, with mud walls and thatched roofs, built on the outside of the walls, inhabited by the Rájá's slaves; a small spring to south and east of fort, about 500 feet below, and another to west at a short distance, supply drinking water.

Slavery exists here and throughout Nepál, all castes being sold into slavery, the father having power to sell his children; but on being sold, individuals lose their caste. It is reported, however, that Jung Bahadur has intentions of suppressing this practice. On the 22nd I left Bhajangayá, and at midday came up to the Bargujál ghát, on the Seti River, and about 4½ miles from the former place. The road from Taglakhar to Sil-Garhi and Doti, which follows the course of the Seti, crosses at this place from the right to the left bank by a rope-bridge, 180 feet long and about 20 feet above water. The river comes winding from a northerly direction to this place, and from the snowy mountains distant about three days' march. Between this and the snows is Humla pattí, from which hawks, black minas, and musk-pods are brought for sale to Beramdeo Mandi and Gola Ghát Mandi.

From the ghát my road lay along the left bank for about 2½ miles, and to where the Chanakhola, a river formed by spring water, joins it, and then followed up the latter, crossing and recrossing it occasionally. I halted for the night at Majh, one of the five villages of Chana pattí, which includes the valley drained by the Chanakhola.

On the 23rd, about midday, I left the Chanakhola, where it is met by the Jhalaragár, crossed a pass over the Than ridge, which was covered with oak and chesnut, and entered Bájru pattí and remained at Dogra. Bájru Fort, where the Rájá lives, is on the summit of a hill, about 5 miles from this in a south-easterly direction, and on the same side of the Dogragár. It is smaller than Bhajangayá Fort, being 500 paces in circumference, and contains one house and is surrounded by oak-trees; no cultivation was to be seen about it. There was a good deal of excitement in this place, caused by an order of Jung Bahadur for raising troops. Places which formerly supplied 100 soldiers were now required to give 150, and such as were not formerly required to furnish them were now to raise men according to the revenue paid in by them to the Government. Four hundred

men used to be quartered at each of three places, Dandalidhura, Sil-Garhi, and Dailekh; there are now 600 men at each place, that is, half as many again, and at Sil-Garhi arms are now being manufactured.

On the 24th I crossed a ridge coming from the Than ridge. Before leaving its summit I came upon a deep round hollow filled with water, about ½ a mile in circumference. The water is blue and is said to contain fish, though I did not see any: there is no visible supply of water to the tank. To the east and at the edge of the water is a small temple of masonry, called Thábur Debí. In the month of August, at the time of full moon, the temple is visited by people of the neighbourhood. The hills about here are covered with oak and rhododendron. About midday, having descended to the Kunragár, passed through the village of Máitoli, about 4 miles from the temple and tank, and following the stream, I sighted Kunragarhi on the wooded summit of the ridge to the south of the Kunragár: although called "garhi," there is no fort, and all that can be seen are two stone-walled thatched-roof houses, where the Rájá resides. The hill is rugged, and covered with oak and rhododendron trees, and about 1200 feet above the stream. The so-called Rájá is rather a zamíndár who collects the revenue of the Kunra pattí. I stopped for the night at Sudap, in the Kunra pattí, the road kept to the left bank of the Kunragár to this place. This pattí has a few villages far removed from each other, there being only one on the road between Máitoli and this. The road was difficult.

On the 25th I left the Kunragár, which flows eastwards into the Buri Ganga, also called Bhaunera, about 3 miles, and crossed the Pinalekh ridge, the boundary between the Kunra and Jugárá pattís, and came into the village of that name in the latter pattí (25 houses), 5781 feet above sea-level. I left this on the 3rd August and descended to the River Bhaunera, or Buri Ganga, about 2½ miles below. This comes from the snowy mountains which are seen to the north-east, about 16 miles distant. The river at this time of the year is about 150 feet wide and 8 or 10 feet deep, with a rapid current. It is crossed at this place by means of a rope; a road following the course of the Bhaunera goes to Sánpia ghát on the river lower down. To the south of the place where I crossed the river is a high peak on a snowy ridge, under which, at the height of the ridge, is Malka Debí temple, well known and visited by pilgrims from Kumaun and Garhwál, as well as from Nepál, during the time of full moon in August. There are approaches to the temple from all sides. From the river I crossed a spur, about 1000 feet high, and encountered the Mártorigár, a tributary of the Bhau-

nera, a little lower down. This stream, though not containing any of the drainage from the snows, has deep water, and is crossed by wood being thrown across it. About 6½ miles further up the stream is Jili, consisting of 10 or 12 houses, where I remained for the night. The village which gives its name to the stream consists of 100 houses, and is about a mile from the stream on the opposite side, at the place where I descended into the valley. On the 4th I followed up the Mártorigár and halted at Rajtoli: there were no villages on the way. Rajtoli, consisting of 10 or 12 houses, is situated at the junction of two streams which make up the Mártorigár; one of them is called the Rajtoligár and the other the Parkhiagár, which takes its rise at the Parkhia-lekh hill. On the 15th I followed up the Parkhiagár to its source and crossed the Parkhia-lekh (about 8095 feet above the sea), which is on the boundary between the Bájru zilla on one side and Jumla on the other, and halted for the night at Kálápora village (50 or 60 houses), in the Kunrakhola pattí. On the 6th I followed the Kunrakhola to its junction with the Balarigár, about 3 miles from Kálápora, about 6071 feet above sea, and crossed the latter, a river which does not take its rise in the snows, but is during the rains too deep and rapid to be forded. The bridge by which I crossed is wooden, and between 40 and 50 feet in length; the depth of the water is about 5 feet. Balarigár, below its junction with the Kunrakhola, is called by the latter name. The slopes on either side of the stream are cultivated, and there are several villages. I kept to the left bank to its junction with the Karnáli River. Hereabouts there are more villages and cultivation on the left bank of the Karnáli than on the right bank. Higher up the river, about 1½ mile above Bánda village, I crossed the Karnáli at Jira ghát by a rope-bridge, about 200 feet in length and 60 feet above water. On the 7th, after going north along the river for a short distance, I turned up the Khátiarkholagár at its junction with the Karnáli and kept along the stream, crossing and recrossing by small wooden bridges occasionally, and halted for the night at a deserted cow-shed (Gahu-ka-gót). About 2⅔ miles above this a small stream, the Kanwakholagár, coming from a south-east direction, joins the Khátiarkhola; my road lay along the former. There is also a road along the latter, which comes from a north-east direction to this junction, leading to Múngú Bhót. I left the Kanwakhola about 2½ miles above the junction, and ascended the hill to the village of Kálákhatá (50 or 60 houses), about 1½ mile above the stream, where I remained for the night: it is 12,484 feet above the sea. On the 9th I crossed the Kálákhatá ridge—very high (about 14,528 feet)—on which the birch and juniper grow, and entering a ravine, arrived at Lurkon village

on the Sinjakhola or Himawati, a river coming from the snows, distant about 13 miles, and entering the Tila River. I halted at Lurkon on the 10th. The Sinjakhola pattí is considered the most productive in these parts. Rice is the only crop, raised by means of irrigation. Ponies are bred in great numbers in this pattí. On the 11th I crossed the Sinjakhola, a little less than a mile above the village of Lurkon, by a wooden bridge, 2 feet wide, 200 feet in length, and 15 or 20 feet above water. The current is very rapid and 7 or 8 feet deep. The road then ascends by a ravine a high ridge (about 13,000 feet), with birch and juniper growing on its summit, which it crosses. On the 12th I descended into a ravine which joins the Tila River below Chaughan, and along which the road runs, and arrived at Chaughan (Jumla), situated on the banks of the Tila River, and about 8016 feet above sea-level. Chaughan consists of a collection of mud houses, forming a street occupied by five or six bunniahs, two or three cloth-merchants from Doti, and forty or fifty priests of the Chandan Náth Mahadeo temple; a few paces to the east of the street are located the custom-house people, 300 sepoys, three subhadárs, and a captain, Debí Mánsing Basaniath, who is also head man in the Jumla Zillah. To the south-west of the street are the stores of guns, ammunition, and provisions; within an enclosing wall, 600 feet east and west, and 400 feet north and south, with a gate to the north, these are also of mud. Chaughan is situated in a plain running north-east and south-west about 3 or 4 miles, and about 1½ mile in breadth, surrounded by high mountains about 12,000 feet above the sea. The whole valley is cultivated, and there are numbers of villages scattered over it. A road from Taglakhar passes through Chaughan and Dailekh, and goes on to Lucknow. Having got a pass and letter of introduction to the Loh Mantang Rájá I left Chaughan (Jumla) on the 18th.

On the 20th I left the Tila River and crossed the ridge to the south by a pass, the Morpáni Lekh, about 12,458 feet above the sea, descended into the Kaikhola valley in the Tibrikot zillah, passed through Bhotia (7 or 8 houses), and halted for the night at a temple between 2 and 3 miles further on and a mile from the Kaikhola River. A road goes from these parts to Lángú Bhot, distant 8 or 10 marches, by the Kaikhola. Next day I crossed the Balangúr Lá Pass, lower than the Morpáni Lá, on which oak and rhododendron grow, and reached Tibrikot. Tibrikot is situated on the right bank of the River Bheri, where it is joined by a small stream from the snows to the north, and about 7226 feet above the sea-level. To the south of the village about 200 yards, on a hillock about 200 feet high, is a fort (Kot) which encloses a temple and three or

four houses. I was here shown the Civil and Criminal Code of Nepál, which is taken partly from the Shástras and partly from the Indian Code of Civil and Criminal Procedure. It is in the Nepálese language. Having obtained another pass from the Thánadár of this place I left Tibrikot on the 27th.

From Tibrikot I followed the course of the Bheri River and reached Charka on the 4th September, having passed some Lámaserais on the road. One of them, called Barphang Gonpa, contains 40 or 50 Lámas. Near another, named Kanigang Gonpa, the river has high perpendicular, rocky banks, and the people have made a tunnel 54 paces in length through the rock. There was originally a crevice, and the rock on either side of it was cut away sufficiently to allow of a man with a load to pass through with a squeezing, the height of the tunnel not being sufficient in all parts to admit of his going through standing. Charka is the last village on the River Bheri. On the opposite side of the river is a Gonpa (Lámaserai) to which the first-born male of every family in the village, as is the practice among the Buddhists generally, is dedicated as a Láma. I left Charka on the 5th, and ascended the Digi Lá, about 16,879 feet above sea-level, called by Goorkhas Bátali-Pátan, by a gentle incline, On either side of the pass there are snow-covered ridges. The pass is broad, and there is a cairn on it at the watershed. From Digi Lá I descended to the junction of two streams, one coming from a northerly and the other from a westerly direction, which together take an easterly direction and form the Kingi Chú. On the 7th I reached Kágbeni, crossing the Káli Gandak by a wooden bridge. Kágbeni is situated at the junction of a stream coming from Muktináth, with the Káli Gandak, and is about 8953 feet above sea-level. It consists of about 100 houses, and is inhabited by Bhots.

From Charka there is also a direct road to Labrang Koja, near Tadum, from which after crossing a high snow-covered pass, distant about 20 or 25 miles from Charka, another road branches off to Loh Mantang. Laden sheep, goats and horses are taken over these roads.

From Kágbeni I made a trip to Muktináth, about 11,284 feet above the sea, for a day, to see the temple and the country about it. About a hundred feet to east of the temple is a spring with a sulphurous smell, which enters a cistern from which the water runs out from 108 spouts, under each of which every devotee passes. The water collecting in a trough below passes out in two streams, which flowing to north and south of the temple, meet to the west, thus encircling the temple with water. About 600 or 700 feet from the temple, to the south, is a small mound with a little still water at its base, having

a sulphurous smell. From a crevice in this mound, at the water's edge, rises a flame about a span above the surface. The people of the place told me that the water sometimes increases in quantity sufficiently to flow into the crevice; the flames then disappear for a while, and there is a gurgling noise, a report, and the flames burst up and show again. This spot is called Chume Giarsa by the Bhots. To the north-west of the temple, about 350 yards, is a Gonpa with about 30 or 40 resident Lámas. To the east and south-east of Muktináth, about 2 miles, are lofty snowy mountains extending in a north-east and south-west direction, from which the stream takes its rise, which flows by Muktináth to the north, takes in the temple water, and joins the Káli Gandak river at Kágbeni.

On the 9th I returned to Kágbeni, and on the 10th started with my party, following up the river Káli Gandak. About 6 miles from Kágbeni I crossed a small stream coming from Damudarkund, along which the Loh Mantang boundary runs to the east, and from the junction with the Káli Gandak follows up the latter in a northerly direction. I here left the river which above this flows through a very confined valley. To the west about 2 miles is a snowy range. There are forests of cedar below the snows: no other trees are to be found. On the 11th I went to Khamba Sambha village. The road, which keeps to the hill-side, is broad, and there is a great deal of traffic on it.

On the 12th I went to Changrang village crossing the Chungi Lá Pass, about 11,000 feet above the sea, on a spur from the snows. Changrang consists of 30 houses and a fort, the winter residence of the Loh Mantang Rájá. A road, chiefly used by pilgrims, from Muktináth by Damudarkund, crosses the Káli Gandak by a ford about 2 miles east of this, and joins the other from Kágbeni to Loh Mantang here. It can be ridden over on horseback; the ground over which it passes is not rugged nor high, but there is a scarcity of water, and no habitations are met with.

On the 13th, after a march of 7½ miles, I reached Loh Mantang. Loh Mantang is situated in the centre of a plain, about 11,905 feet above sea-level, between two small streams which meet a little before entering the Káli Gandak, distant about 2 miles; the plain is irrigated by channels. Loh Mantang is enclosed by a wall of white earth and small stones, about 6 feet thick and 14 feet high, forming a square with a side of ¼ mile in length, and having an entrance by means of a gate to the east. In the centre is the Rájá's palace, consisting of four stories, about 40 feet in height, and the only building to be seen from the outside. In the N.E. corner of the enclosure is a Gonpa

containing copper gilt figures and 250 Lámas. There are about sixty other houses, two-storied, and about 14 feet in height, forming streets and lanes. Drinking water is brought in by means of a canal, and this overflowing makes the interior slushy; and since there is always an accumulation of filth the smell is very offensive. Since no census is taken, I cannot say how many people there are in the place, but they appeared to be numerous.

Besides the permanent residents there are always numbers of traders from Thibet and Nepál, who either exchange their goods here or take them to dispose of at Lhásá or Nepál. The trade in salt and grain does not extend very far north. Trade is chiefly carried on by "Tháklis," a class of traders of mixed origin, who have the privilege of going to Lhásá, and they even go to Calcutta for the purchase of goods. The Rájá, who is a Bhot, collects a revenue from all sources of about 10,000 or 12,000 rupees a year, out of which he pays about 2000 or 3000 yearly to Nepál from the land revenue, and 10 per cent. of the taxes levied on goods brought from across the northern frontier, to the Lhásá Government.

The Rájá was very much averse to my proceeding further, the orders of Jung Bahadur that no one should cross the frontier being very stringent; however, I was determined to proceed at all hazards, and succeeded at last in procuring a pass.

I may here mention a custom which prevails in this part of Nepál. On a death occurring, the head Láma at the Gonpa is consulted as to the disposal of the corpse. On being informed of the day on which the death occurred he consults his writings, and gives orders according to the directions therein contained. The corpse either must be buried as it died, or be cut up and thrown to the birds; or the arms and legs being cut off and thrown out of the town, to north, south, east, and west, the body must be buried; or lastly, the body must be burnt in a sitting posture.

Leaving Loh Mantang on the 19th, I crossed the pass Photu Lá on the 20th, the boundary between Debajúng in Lhásá (Thibet) and the Nepál possessions. The pass is about 15.080 feet above the sea. There is a descent of about 250 feet from the pass on to the plain below. I passed thousands of wild horses grazing on the plain; they were in herds of about 100 each, and are not at all shy. On the 21st I encamped at Chumikgiakdong, a sheepfold on the stream which flows to the west of the plain. Leaving my things at Chumikgiakdong, I went to Labrang Koja, an encampment distant 9 miles. The river is here about 250 feet wide and has a very gentle current.

It is crossed by boats made of yak's hides which are sewn at the ends and are attached to sticks at the sides; they are kept dry and thus retain their shapes. After two or three crossings they are drawn on shore to dry. They are propelled by two or four oars, and two or three men can cross in each. Next morning, the 23rd, I started for Loh Mantang, and crossed the Cháchú Sángpo 2 miles above its junction with the Brahmaputra. This stream is about 3 feet in depth and 60 feet wide, and comes from a snowy ridge about 14 or 16 miles north of Mantang; I forded it, and going ¾ mile farther on arrived at Tadum.

Tadum consists of twelve houses and a Lámaserai (Gonpa) situated at the foot of spurs coming from the snows to the north. The former are occupied by men whose duty it is to forward property or letters for the Lhásá Government, or such as they may receive orders to forward. For this purpose they have ponies, yaks, goats, and sheep, and their beat lies 2 or 3 marches either way. They are not remunerated directly for their trouble, but escape taxes, the head-man of each station, "Tarjum," only receiving a small percentage on the taxes. The "Gonpa" only contains 10 or 12 Lámas. The day following my arrival the head-man, "Gopa," sent for me and questioned me as to the object of my travels. I told him I was a physician on my way to Lhásá, and shewed him my passes. He, however, refused to allow me to proceed as it would be at the peril of his own life. I was then locked up for the night. Next morning I made an ineffectual attempt to see the Gonpa, and my messenger returned with a sowár who had orders to see me across the frontier. On the second day after my arrival, I began, with great reluctance, and under threats of personal violence, my return journey, and reached Loh Mantang on the 28th.

I reached Kágbeni on the 1st of October and on the 2nd started south, following the course of the Káli Gandak. The road first keeps along the bank of the river for about 7½ miles and then crosses by a wooden bridge 55 feet long and 10 feet above water, depth of water 4 feet, and goes to the village of Marmáli (100 houses) about 3½ miles further on, where I remained for the night.

On the 3rd, following the right bank of the river, I passed through the village of Tukja, consisting of about 100 houses, at which there is a custom-house, and having crossed the river by a wooden bridge about seventy feet long, I re-crossed the river to Lidi village, where I remained for the night. On advancing from the first crossing of the river about 2 miles, I came opposite a large village situated on the right bank of the river,

called Thak, consisting of about 150 houses. Lidi is a small village of four or five houses, the inhabitants of which are traders, and do little in the way of cultivation. On the 4th, about ½ a mile from Lidi, I passed another village of the same name, consisting of about twenty-five houses, and at midday reached Ghás Bhansár, where there is a custom-house. I stopped at Dan Bhansár, which also owns a custom-house.

On the 5th no villages were met with during the march, and the road passed through jungle the whole distance, crossing several small streams running into the Káli Gandak. I passed the night in the jungle.

On the morning of the 6th I crossed the river about 1 mile below the last halting-place. Two and a half miles further down on the right bank is the Ráni Powa Dharmsála (rest-house), above which on the hill-side and to the west is a large village. A further walk of 1½ mile brought me to the Rangár River, which comes from a westerly direction, from the snows, and joins the Káli Gandak. I crossed it at the junction by an iron suspension-bridge, constructed at the expense of the Rání, who built the rest-house. The bridge is about 175 feet long, about 15 or 16 feet above the water. The bridge consists of two thick chains, to which the roadway of planks is suspended by iron rods, but as these are of equal length the roadway has the same curve as the chains. Nearly 2 miles further, on the same side of the Káli Gandak, is Beni-bazar, a village of about 200 houses. There is another village, with shops, on the opposite side of the Káli Gandak, called by the same name. There is communication between the two villages by a rope-bridge, and a road, not fit for horses, goes to Pokhra. To the west of the village, on the hill-side, is a copper-mine, which is worked, and the copper is either sold and taken to Pokhra, or it is converted into vessels in the village, or coined.

On the 7th I crossed the River Maidi by an iron bridge similar to the one over the Rangár, and marched to the village of Bák-lúng, situated in the Báklúng Pattí. It consists of fifty or sixty houses, and fifteen or sixteen shops. There are copper-mines on the hill-sides. A captain is stationed here to look after the coining of pice at this place and at Beni, and the revenues from all sources.

On the 8th I crossed the River Káli Gandak, ½ mile to the east of this, by boat, the current being so gentle as to admit of it without risk. The river is about 250 feet wide; the water at this time of the year is not clear, and fills the channel. I remained the night at the Rájá's residence at Panglang, which is 1 mile from the river. I halted on the 9th, and on the 10th started, and arrived at Kusamchaor bazar, at the junction of

the Moti Naddi with the Káli Gandak. This village, which gives its name to the Pattí to the north of the Moti and east of the Káli Gandak, consists of about 100 houses, scattered over a plain about 2 miles long and about ¾ mile broad. There are copper-mines along the hills on the opposite side, but none on this side. Moti Naddi rises in the snows to the north-east, and flows in a south-westerly direction, carrying into the Káli Gandak about one-third the quantity of water the latter contains above the junction. It is crossed 1½ mile above the junction by an iron suspension-bridge, 135 feet long, and about 12 or 14 feet above the water, which is about 7 or 8 feet deep, similar to those over the Rangár and Maidí. A road to Pokhra fit to ride over starts along the left bank of the Moti from the bridge; horses have to ford the river.

On the 11th I passed through a large village, Dámar, well cultivated, containing about 100 houses on the left bank.

On the 12th I went to Púrthi Ghát, on the river's edge, about 2036 feet above sea-level. Púrthi Ghát contains about fifty houses and fifteen shops, and is in the Gúlmi Pattí. To the west of this, about 2 miles on the hill-side, are copper-mines, which are being worked in fifty places, and it is said there is abundance of the ore along the hills to the right of the Káli Gandak between Báklúng and this. I remained at Púrthi Ghát fourteen days, with the intention of spending the winter there, and then making another start for the north to carry out the orders I received, but changed my mind and determined on going to Dehra, in order to submit what I had succeeded in doing, as my time would thus be employed, and I should besides avoid the risk of losing my notes in case of discovery, to which suspicion on the part of the authorities might lead. I left Púrthi Ghát on the 26th, and reached Lúnthigáon that night. Next day I passed Aslewá Phedi, or Aslewá Tar, a village consisting of twenty-five houses, in the Gúlmi Pattí, situated on a plain, and about ¼ mile from the Káli Gandak, crossed the Rúdar at Badiár Ghát, where the river is about 125 feet wide, and five or six feet deep, and stayed for the night at Riri bazar, about 1035 feet above sea-level, at the junction of the Riri Khola with the Káli Gandak. Riri bazar contains fifty shops, kept by Niwars, a mint where pice are coined, and a custom-house. The pice, called Gorakhpuri pice, are forwarded from this for circulation in the Gorakhpur district, where they are current amongst the people, though not received at the government treasuries. The only copper coin current in Nepál is a mixture of iron and copper, made at Katmandu; forty-eight Katmándu pice go to the Nepál "mohur," and two mohurs and two annas of the Indian coinage

go to the Indian rupee. Two great roads cross here, one coming from Sil-Garhi Dailekh and Salena, and going to Pokhra and Katmándu, and the other from Muktináth and Loh Mantang in the north to Gorakhpur in the south; there are postal arrangements along these high roads, the runners being Brahmins, who have this work made over to them in consideration of their caste, no other calls for work being made on them. There are stations along the roads at the distance of 3 kos, or 6 British miles.

On the 20th I halted at Tánsen, which is about 4668 feet above sea-level, and gives its name to the Pattí. At Tánsen there is a fort, a gun-foundry and manufactory of small arms, forty or fifty shops, and numbers of huts, in which the sepoys quartered here live. The fort is a square building, about ¼ mile in circuit; the walls are about twelve feet high, and made of brick and mortar, with an entrance on the north. Inside are two-storied houses of brick and mortar, which are used as the magazine, court-house, and treasury, and to the west is the residence of General Badri Narsing, governor of the district, with an exit from the fort by a small door on the west, through which the members of the household go to the temple, about thirty feet from the fort. Formerly 1100 men used to be stationed here, but now there are 1600, who are drilled daily by two discharged subhadárs of the Native Indian Army; there are no barracks or lines for the men, and they are accommodated in huts. Guns, as well as small arms, are manufactured in a small brick-and-mortar building to the south of the fort. To the south-west is the parade-ground. During winter the place is deserted, the general and troops going to Batoli, distant 15 miles, the other inhabitants also moving to warmer quarters.

On the 14th of November I came to Pilhua village, which gives its name to the pattí, and the next night to Ratamati village, in the Rámpúr Pattí. The valley here opens out for some distance to the west, and there are numbers of villages of average size on either side of the river; on the hill-sides are forests of pipal, sál, bar, and other tropical forest-trees. On the 15th I followed the course of the Káli Gandak on the right bank, and 2½ miles from Ratamati came upon the roads from Batoli and Deoniagarh, which join here, cross the Káli Gandak at Kilri Ghát, and go onward to Katmándu, joining the road from Pokhra to Katmándu at Chorkatiatar, near Gorkha Darwar, from which another branches off, and following up the Buria Gandak communicates by Nubri with Thibet. I remained for the night at Thalitár. On the 16th, still keeping to the right bank, I arrived at Kúmalgáon, or Ghumari, consisting of twenty-five houses, inhabited entirely by Kúmhárs, who,

besides cultivating the land, make baked earthen pots, which they dispose of in the surrounding villages. On the 17th I remained for the night at Tárigáon, which is distant from the river about 1000 feet on the slope, and about 600 or 700 feet above it. On the 18th I reached Naoakot by a gradual ascent of nearly a mile along the hill-side. From Naoakot the road goes to Arkhali village, distant about ¾ mile, containing about fifteen houses, and thence to Bishartar village (thirty-six houses), where I remained for the night. The Káli Gandak is about 1 mile distant, and about 7 miles lower down is joined by the united waters of the Tursuli Gandak and Buria Gandak rivers. The junction is called Deb Ghát, and is held in veneration by the Hindoos, a temple being built there. Below the junction the river is called the Naraini, and has a south-easterly direction. On the 19th I remained the night at the village of Múkundpúr. None of the villages I passed through on the march had any cultivation in their neighbourhood, but were merely summer residences of the people, who during the winter months take all their belongings to the plains to the south, where they have their rice-fields. My next halting-place was Kunjoli. To the west of Kunjoli, about 6 miles, is Nawalpúr, where there is a Thánah, with a captain and twenty-five sepoys, whose duty it is to look after the timber floated down the Gandak or Naraini. On the 21st I went to Linávar village, containing 100 houses, distant 10¼ miles, where I remained for the night. On the 22nd I intended crossing the river at Kúlhúá Ghát, 6½ miles lower down, but finding no boatmen, I remained at Kúlhúá village for the night, and crossed the next morning.

I remained for the night at the junction of the Naraini and a small stream called the Panchperna and Saonmukhi, where there is a brick-and-mortar temple and rest house (Dharmsála), and four or five huts belonging to the customs' officials. I crossed the river by boat next morning, the 24th. The river at the place of crossing is about 800 feet; at the ferry on the right are some huts, to which the captain and twenty-five sepoys employed in the floating-timber business come during winter. I went on to Gidhagáon, distant about 9½ miles in a south-westerly direction. About 3 miles from this, in the same direction, I came upon Bhojágáon, a frontier village of Nepál, where there is a custom-house, and passes are shown and luggage examined. A little beyond Bhojágáon I crossed the boundary, and though disappointed at my want of success in Thibet, I felt thankful that I had been able to return to British territory with such information as I had got together.

XIV.—*Survey of the Lower Course of the Rufiji River.* By Captain G. L. Sulivan, R.N.

[Communicated by the Lords Commissioners of the Admiralty.]

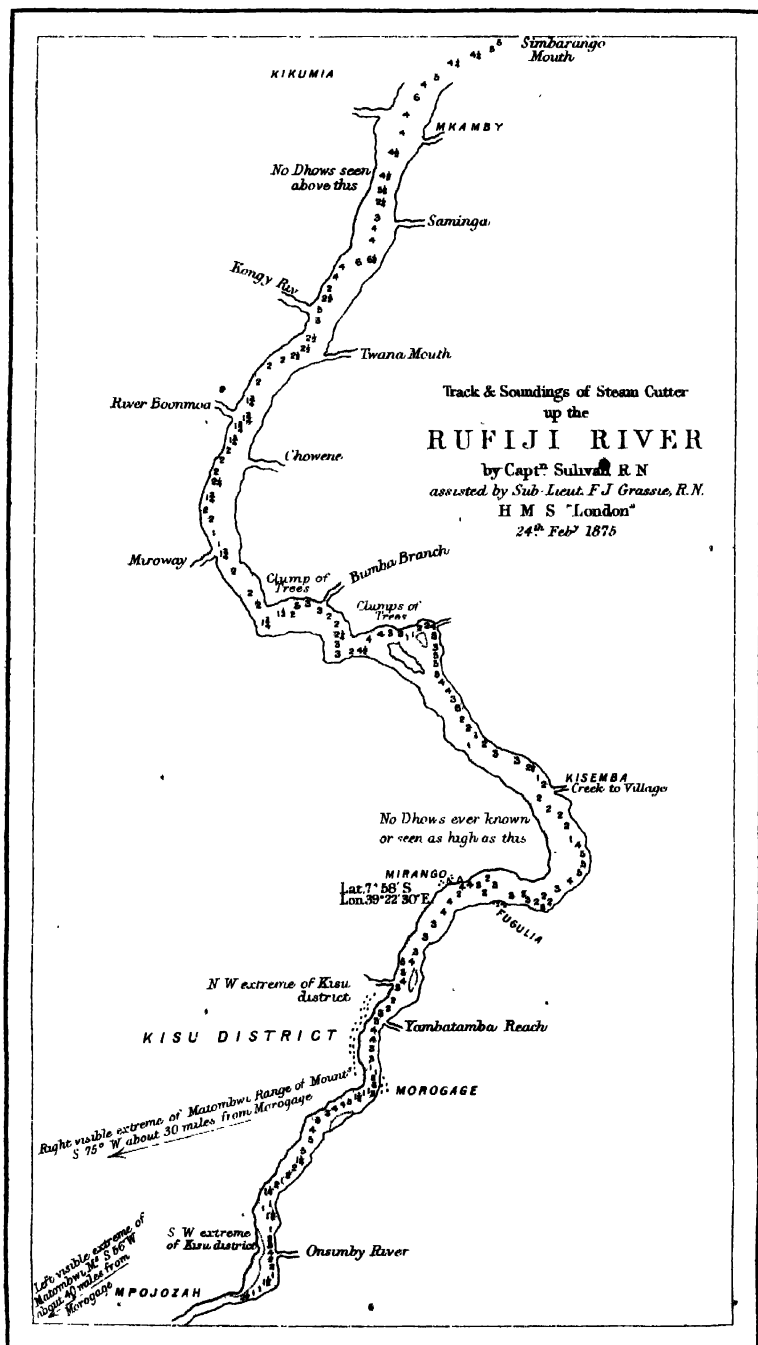
H.M.S. *London*, Zanzibar, April 6th, 1875.

I have the honour herewith to enclose, for the information of the Hydrographer of the Admiralty, and also (with their Lordships' permission) of the Royal Geographical Society, a chart of a running survey I have been enabled to obtain of the Rufiji River as far as Mpojozah, beyond the Kizu District, and about 8 miles above Fugulia, the point reached by Dr. Kirk and Commissioner Wharton of H.M.S. *Shearwater*, in 1873.

On the evening of the 23rd of February last, I arrived off the river with three boats belonging to the *London*, and at one o'clock the following morning, accompanied by Sub-Lieutenant F. J. Grassie, R.N., by whom I was ably and zealously assisted, proceeded to ascend it, with a view to ascertaining its direction beyond Fugulia, and whether or not it is navigable. Also as to the probability of any slave-tracks crossing it below that at Mpenbeno, which was discovered and traversed by Captain Elton and Lieutenant Pullen, R.N., in 1874; and if so, whether by stationing boats in the river (as has been suggested) it would be practicable to cut off the transit of, and thus suppress the traffic in, slaves.

About 2 miles beyond Fugulia, and on the left and opposite bank of the river, is a small village called Mirango, at which we were able to obtain observations for latitude and longitude. (Lat. by double alt., 7° 58′ S.; long. by chronometer, 39° 22′ 30″ E.) From Fugulia which, according to the chart made by Captain Elton and Lieutenant Pullen, R.N., lies nearly south of the Simba Range, and from this to beyond the Kizu District, I found that the river winds to south-west, and in the direction of Mpenbeno, the position of which place is accurately laid down by observations obtained by Lieutenant Pullen in 1873, and towards the Matumbwi Mountains, the northern extreme of which is about west by south of Fugulia, and *not* towards the Mtoti Range, which lies north-west of the river. There are no mountains due west of it.

The position of Mpenbeno, as given by the before-mentioned officers, is about 22 miles south, and 18 miles west, of the Simba Range; and it was also discovered by them that it was the place at which the great slave-track from Kilwa to Dar-es-Salaam crossed the Rufiji. I shall presently be able to show that to cross either east or west of Mpenbeno would not only be most inconvenient for the trader, but impracticable.



Edwd Weller

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I shall, however, first confine myself to the question of the navigability of the river; and, to begin with, I may as well say that I fully concur in the opinion of Dr. Kirk and Commissioner Wharton that the Rufiji is *not* navigable, unless the possibility of a small vessel at some seasons of the year being able to ascend it for 8 or 10 miles is sufficient to justify its being called so. The river, at the time of my entering it, had the advantage of being considerably deepened above the tidal portion of it by the rains which had set in three weeks previously. Great allowance must, therefore, be made for this fact in estimating the true depth. No deduction on this account has been made in the soundings given in the chart, as it would be almost impossible to be accurate, but from 4 to 6 feet would not, I think, be too much to allow for the rise thus caused. The current also, against which we had to steam, had increased in proportion, and continued to do so the farther we ascended the river; but, as the speed of this was ascertained, due allowance has been made for it in the chart. At Mpojozah, beyond the western boundary of the Kizu District, the speed of the current became nearly as great as that of our boat; and it being inadvisable to detain the men in the river after night at this season of the year, I was reluctantly compelled to postpone further research until after the rains. In the mean time I have to remark, that neither the main slave-track nor any other could possibly cross the Rufiji east or west of Mpenbeno; because that place, and the track which passes through it, are flanked by the Matumbwi Hills south of the river, and the Mtoti range north of it; whilst eastward the numerous branches and feeders which form the deltas at the mouth of the river offer an almost insuperable obstacle to its passage on that side. Were it not for these natural obstructions, the high road through Mpenbeno would not be chosen either for the transport of slaves or for the conveyance of the "Copal" from those rich fields which lie at the base of the range of mountains before alluded to, much of which now finds its way into Kilwa, and the various towns of the Samanga District, where it is purchased by the Indian merchants and conveyed north. This, it is evident, would not be the case were the road eastward practicable, as the distance thus saved in reaching the northern markets would be very considerable.

To these conclusions and convictions I have been guided, not only by the configuration of the country, which in itself would be sufficient, but from information which I collected in the river, and also from our pilot, whom we obtained at the entrance, and who told us that he knew every part of the river, a statement which we proved to be correct. He also, lest any

proof might be wanting to convince us of the extent of his knowledge, informed us that he had wives in two different places at the head of the river, and the difficulty we experienced in getting him to leave one of these places and accompany us further bore ample testimony to the fact. Further, the comparatively happy security in which the natives in the immediate neighbourhood appeared to live, the absence of any vessel larger than the ordinary small river-canoe, and the fact that no dhow was seen, nor, as we were told, had ever been seen, above the entrance to the different mouths of the river, all pointed to the same conclusion.

No Indian or Arab traders are to be found in the vicinity; the slave-dealers, therefore, would experience great difficulty in crossing the river below Mpenbeno, as they would be unable to obtain from the natives the necessary assistance and co-operation. The simple natives of the Rufiji, living so near the sea, are protected to some extent by their knowledge of, and intercourse with, the outer world, and the semi-civilized condition they have acquired from it. This would, in some measure, help them to assert their freedom, or recover it sooner or later if lost, but they would have only too much cause to fear for their children were they to risk communication with any passing slave-gang, and they would, therefore, on the first approach of the slave-dealer with his caravan, take refuge in their canoes, and flee with their families to the opposite bank of the river; thus cutting off the only means by which the slaves could be taken across the river in safety. Further, it is contrary to all experience that any caravan (still less such a valuable one as slaves) should run the risk of entangling itself in an intricate and difficult delta, more especially one subject to such sudden and dangerous inundations as that through which the Rufiji flows, owing to the effect of the rains on the adjacent high lands.

It has been suggested that steamboats should be employed to intercept the imaginary slave-tracks across the Rufiji; but even if such tracks existed and were known, the utter impossibility of such a scheme is evident. The river above Fugulia is nowhere more than 500 yards wide, and in some places is less than 200. Supposing, therefore, a dozen steamboats were stationed in the river, say at intervals of a mile or so, their position would be well known, they would constantly be in view, and nothing could be easier than to shoulder the canoes, and, marching with them to any point, launch them again between any two boats or ahead of all, and cross the river unseen at night. A game of blind-man's-buff might thus be played to the dead-march tune, and a hundred Europeans sacrificed for every slave liberated.

The scenery in the Rufiji has little or no variety. The level country which forms the delta is covered with now ripening Indian corn and millet-seed right down to the banks of the river, without a break for the whole distance we ascended, excepting that here and there a coco-nut grove towered above the corn, indicating the locality of a village, or a few mango, pomegranate, and banana-trees, scattered sparingly about, broke the monotony of the scene. We saw but two hippopotami and one crocodile during the time we were in the river, but were informed that, although the former are scarce, the latter are very numerous.

In conclusion, I would observe with what caution reports (however interesting they may be), founded neither on scientific basis, nor having pretensions to any, nor on any reasonable or practical grounds, should be received, more especially when such reports are professedly at variance with the opinions and experiences of scientific and practical men, or other competent authorities.

XV.—*Notes on the Lower Amú-darya, Syr-darya and Lake Aral, in* 1874. By Major HERBERT WOOD, R.E.

The Mouths of the Amú.—THE Amú-darya, Jihoon, or ancient Oxus, takes its rise on the elevated Pamir plateau, and after a course in a general north-west direction, discharges its waters by three mouths into Lake Aral. Commencing on the east and passing to the west, the names of these three branches of the river are, the Yany-Su, the Ulkun, and the Taldyk; the magnitudes, however, of the three different volumes of water contributed to the lake are in the order, Ulkun, Yany-Su, and Taldyk.

Admiral Boutakoff, in his early explorations of the lower courses of the Amú, specified the Loudon Canal, which passed some water into the Abougir Gulf, as a fourth discharging arm of the river. This canal was subsequently closed at its upper end, and whatever water may have entered Abougir from it now passes by the other three arms, but chiefly by the Yany-Su and the Ulkun. It may be doubted whether Loudon was ever more than a large irrigation canal, which passed its superfluous water into Abougir during high floods of the Amú; though it might now have had, had it not been closed, the largest discharging mouth, since it actually ran to the lowest point from where it left the main stream along the shortest line.*

Taldyk is probably the arm by which the Amú-darya first

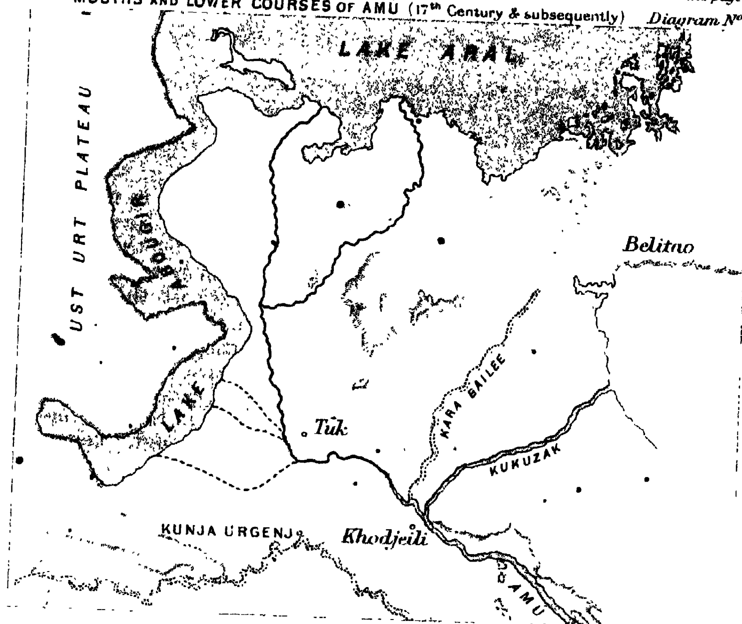
* These remarks do not apply to what Loudon may have been in the tenth century.

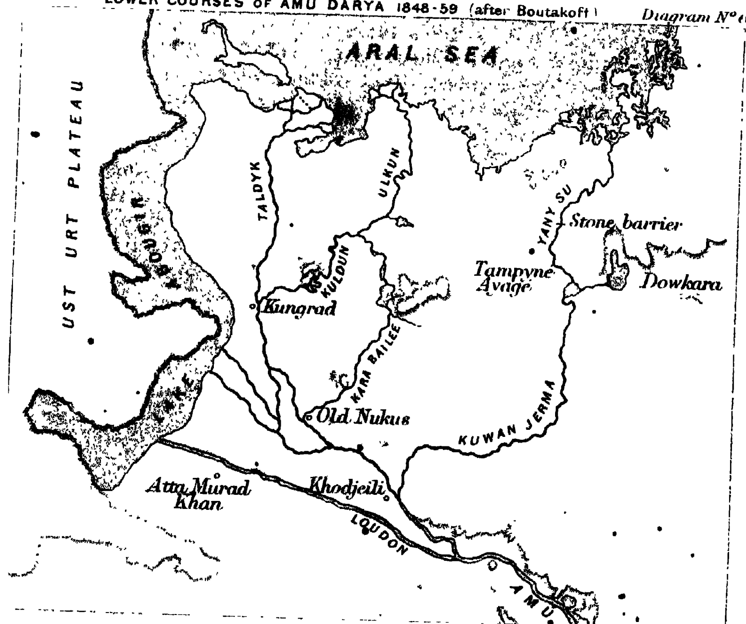
reached Lake Aral, since the river last ceased to flow to the Caspian Sea. In 1848 the officers of the Aral flotilla found a larger quantity of water passing in it than that flowing at the present day, which is probably scarcely one-fourth of the supply contributed by the Amú to Lake Aral. The diminution may partly be due to an extension of irrigation in its neighbourhood, but is so chiefly to the fact that the Khivans erected several dams across it to prevent its ascent by the Russian steamers. Taldyk, coming from the south-east, turns in a northerly direction, and flows fifty miles past the town of Kungrad to its mouth in an almost straight line, from which circumstance it takes its name (Taldyk = straight). At Kungrad it throws off a branch to the north-east, which joins the Ulkun or central arm of the Amú; this branch is called the Kuldun in the sketch illustrating Boutakoff's paper in the 'Journal of the Royal Geographical Society' (vol. xxiii.), though I believe it is not now distinguished by that name.

The Ulkun-darya, or central branch of the Amú, receives a portion of its waters from the stream just noticed, but is chiefly fed by the remarkable mass of lakes and marshes which are situated on the lower courses of the river. Soon after issuing from these, the Ulkun is joined by the stream from Kungrad, and flows due north a distance of 25 miles. Turning then westwards, and running parallel to, and at a short distance from, the south shore of Lake Aral, it discharges its waters by the Ulkun, and 6 or 7 miles further by two or three mouths, of which the Kichkĭnĕ is the largest. The form of this delta seems to be due to the intermittent volume discharged by this arm, acting in combination with sand-ridges or dunes occurring along the shore of the lake. During two-thirds of the year the volume and velocity of the stream is insufficient to pass its waters with ease over the bar at the mouth, and some portion of them consequently find their way along the valley line behind a neighbouring sand-ridge. At the epoch of flood, this subsidiary direction of the stream would be enlarged and continued; and a new mouth into the Lake would be broken through the ridge at any eligible situation. A succession of similar phenomena seems traceable along a line crossing the desiccated country which extends from Fort Peroffsky to Lake Kouktchatengis, near the south-east corner of Lake Aral.

The eastern arm by which the Amú discharges into Lake Aral is the Yany-Su, or *New Water;* and though, as its name implies, it has the most recently-formed outlet, it will soon probably be the principal of the three branches. When ascending it in 1859, Boutakoff (*vide* Diagram No. 6) reached a point some 20 miles distant from the lake, where the further

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progress of his steamer was arrested by a ridge of sandstone crossing the stream. The depths of water over this rocky barrier were found to vary from 1½ to 2½ feet, those in the lower course of the Yany-Su having been from 5 to 8 feet. Boutakoff left his steamer at the ridge, and continuing his ascent in an open 12 horse-power steam-launch, found the channel to be stony, while sharp rocks rose here and there to nearly the surface of the water. In 1874 the same steamer, the *Peroffsky*, commanded by Captain Bruchoff, ascended the Yany-Su without finding a vestige of the obstruction described; and thus, since 1859, the sandstone-ridge has been entirely swept away by the stream. This arm of the Amú is consequently of very recent formation, and it has not yet, in all probability, reached its full development, though it passes fully three-eighths of the Amú supply into Lake Aral. Yany-Su flows in a N.N.E. direction along a distance of about 65 miles, including meanders, out of Lake Dowkara, which in its turn is fed from the main stream of the Amú by the branch called Kuwan Jerma.

The point where Kuwan Jerma leaves the Amú is situated at about 80 miles in a direct line south of the shore of Lake Aral; and in its course downwards to Kungrad are detached from the Amú several streams towards the north, which feed the lakes and marshes described above as draining in their turn by the Ulkun arm into Aral. It is thus seen that the river reaches the Lake by several branches, and forms in its lower course a triangular space, which presents at first sight a remarkable similarity to the delta of other rivers. The apex however, of this triangle is more than 60 feet above the level of Lake Aral, which is in itself a circumstance sufficient to dispel the notion that the country traversed by the lower courses of the river have been formed by alluvial deposits; and in the usual sense of the word, therefore, the Amú-darya cannot be said to have a "Delta."

The Eastern Arm of the Amú.—The banks of the Kuwan Jerma (*New Cut*) Channel, by which, according to local report, a portion of the waters of the Amú-darya have passed down to Lake Dowkara for about one hundred years, are but little elevated. Towards its commencement they are covered with a tolerably thick growth of jidda (*Eleagnus hortensis*) and a scrubby acacia (*Halimodendron*), in addition to some black poplar and a few oriental planes of small size, which have probably been planted. This vegetation is found only on the firmer ground, for on land situated at a low level and subject to inundation, it is generally replaced by a thick tamarisk jungle. The course of the Kuwan Jerma (Section, *Diagram No.* 2) is somewhat tortuous, and the stream in many places cuts through high sand-

hills, which apparently bordered former river-beds, where water must have flowed, at nearly right angles to the direction in which it runs at the present day. Looking eastwards from the summit of these sandhills is seen an extensive tract of country, disposed in long rolls of sand, in the hollows between which lines of shrubby gloomy-looking trees maintain a struggle for existence. This vegetation is periodically alimented by the moisture which, percolating during the flood season into these low levels, and collecting near Kuwan Jerma in pools of water, supports a luxuriant and verdant growth of aquatic plants. But as the eye passes from these green masses to the glowing eastern horizon, the tract of country grows more and more sterile, until the sight is blinded by the glare of the desert sands which stretch into the distance.

Fifteen miles below the head of Kuwan Jerma, the irrigation canal called Kegeilee is detached from the left bank, and waters the country on this side. It carries during high floods at least 150 cubic yards per second; and it forms a convenient line of water communication between the Amú and the town of Chimbye, which is situated about midway between Lake Dowkara and the central mass of lakes and marshes from which the Ulkun arm issues.

Chimbye, a little town of some 1500 souls, is on a height of 31½ feet above the level of Lake Aral, and is surrounded by well-planted gardens and fields, which are fertilised by the water of Kegeilee. The streets are mean and narrow, and bordered by low flat-roofed buildings of *pisé,* whose shelter seems, however, less popular than that of numerous *kibitkas* which are pitched about the town. There appears to be a good deal of traffic in the bazaars, and on market days, which take place twice a-week, a very large number of the country population come into Chimbye. Amidst the surrounding cultivation are many *havélis,* or homesteads; and in a garden surrounding one of the largest of these, is a garrison composed of a *sotnia* of Cossacks.

The country falls eastwards from Chimbye to the shore of Lake Dowkara, whose surface is about 20 feet above the level of Aral. After the cultivation in the neighbourhood of the town is passed, the country in this direction is boggy, and covered with a thick tamarisk jungle. It is traversed by numerous channels, some of which (such as Púr Khan) are of considerable size; these inundate their low-lying banks in the flood season with the waters of Kuwan Jerma, from which branch they are detached at points lower down than the head of the Kegeilee. Across this tract of tamarisk jungle-covered swamp are occasional lines of sand-hills, between which are found reed-covered

lagoons, and on whose summits are seen a few *kibitkas*, inhabited by some miserably-poor nomad Kirghiz.

Lake Dowkara, which is fed by Kuwan Jerma, is a large shallow sheet of water and marshes, extending over an area of about 150 square miles; through whose extent many channels, having a greater depth, pass with tortuous courses. The lake occupies a depression lying at the foot of the Belitao Hills, the line of whose bold sandstone cliffs encircle it to a height of 200 or 300 feet on the north and north-east sides, and trends away with diminished height to the east. By the closing of the Loudon Canal in 1857, which has already been alluded to, an increased body of water was thrown into the Kuwan Jerma Channel, and added to the sheet of water, known as Lake Dowkara to-day. Boutakoff described this as being separated from Lake Tampyné Ayagé on the west by a narrow depressed spit of land, through which the waters communicated by a small stream; and during floods these lakes also effected a junction over the low ground lying between them. At the present time they form permanently a single sheet of water, and the name of Tampyné Ayagé has disappeared in that of the larger water-spread, which also includes the lake of Kungrad on its east side.* It is thus seen that since 1859 the level of the water-spread behind the Belitao Hills has been raised by a few feet; and as in addition the level of Lake Aral has fallen probably about two feet, the sum of these additional falls has been acquired by water flowing out of Lake Dowkara to the outlet of Yany-Su, and the disappearance of the natural dam of soft sandstone which formerly existed on this arm, is thus easily explained.

Issuing from Lake Dowkara, Yany-Su flows in a channel of about 500 feet broad, through low sandhills, and passes the cut it has made through an indurated clay-elevation. Here the banks are from 40 to 50 feet in height, and are covered with the usual scrub jungle, which further down in the course of this arm, is replaced with saksaul (*Haloxylon ammodendron*) forests, as the south-east corner of Lake Aral is approached. On the western bank, near the Yany-Su, marshes extend in the direction of the lower course of the Ulkun, from which an old arm, known as Kazzak-darya, formerly entered Aral. The eastern discharging arm of the Amú forms an approximate boundary between the Karakalpaks to the west, and the nomad Kirghiz to the east.

The Central Lakes of the Amú.—The Amú-darya below the head of Kuwan Jerma sweeps round to the west, and turning again north-west, gives off its waters from the right bank by successive channels, which run in a general northerly direction.

* Not to be confounded with the town of Kungrad, on the west bank of Taldyk.

The oldest and most westerly of these is the one known as the Taldyk branch of the Amú; and a few years back, when a greater volume passed in this direction than does so at the present time, Taldyk threw some of its superfluous flood-waters into the now desiccated Gulf Abougir, which formed an appendage to Lake Aral at its south-west corner.

The channels between Kuwan Jerma and Taldyk, which carry the Amú waters into the central lake and marsh district, owe either their existence or their enlargement to the closing of the Loudon Canal in 1857, by which circumstance an increased volume of water was thrown into the lower courses of the Amú. The largest of these channels is Chartambye (Section, *Diagram No.* 3), which commences about 12 miles below Khodjeili (situated at the apex of the lower arms of the Amú), and runs a distance of 25 miles before actually reaching the central lakes, near the Kashkanatao Hills.

Though the right bank of Chartambye—more particularly in its upper course—is tolerably well defined, its left bank and lower course are bordered by marshes, which in the flood season extend to the west, and joining on to the courses of the other channels lying between it and Taldyk, pass insensibly into the region of rush-covered lakes below.

The central lakes of the lower Amú-darya fill a caldron-like depression, shown roughly on the Diagram No. 4, which has been composed from the map annexed to General Ivanien's pamphlet on Khiva. This, the author states, was compiled from observations made by Mouravin, so far back as 1641, and from others of a more recent date; and it is interesting, since it shows that two hundred years ago the great depression which is now filled up with water was, at that day, probably dry. On the east more particularly, but also on the west and south of the lakes, there is rising ground, whose upheaval by a subterranean force may probably have formed the depression now occupied by the lakes. Just at the northern outlet of the lakes is situated a curious physical phenomenon, which may also be, possibly, a trace of that system of subterranean disturbance stated to be recognisable along a line running from the east of Asia, through Lake Aral and the Caspian, to the countries bordering the Black Sea.

The annexed diagram (No. 5) shows the phenomenon in question, which occurs at the junction of several channels, draining the central lakes at a point near where the Kuldun stream, flowing from Kungrad, joins the Ulkun branch of the Amú. Here in the stiff clay soil are situated two deep, funnel-shaped cavities, where whirlpools are formed. Quantities of fish of a large size sport and jump in the foaming waters, above whose surface

Diagram No 2

SECTION OF KUWAN JERMA

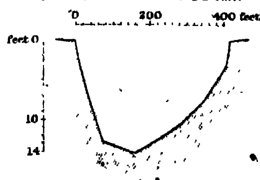


Diagram No 3

SECTION OF CHART[illegible]BYE

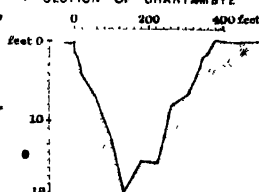


Diagram No 5

PLAN OF WHIRLPOOLS

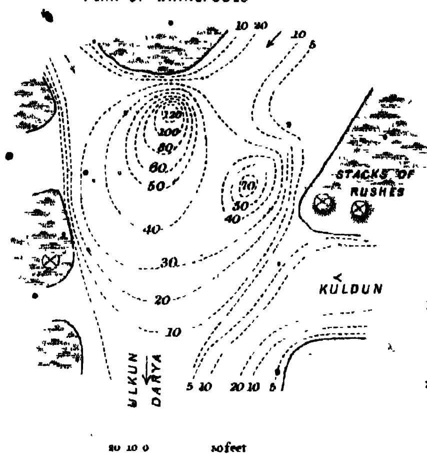


Diagram No 7

SECTION OF OGUZ

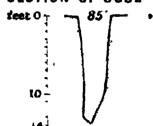
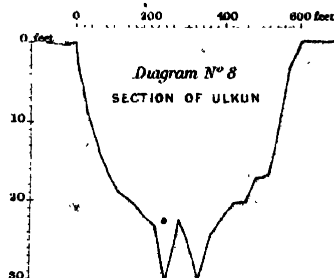


Diagram No 8

SECTION OF ULKUN



SECTION ACROSS WHIRLPOOLS

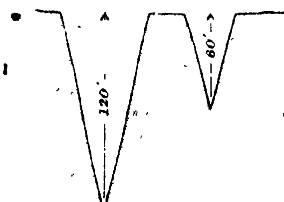


Diagram No 9

KICHKINE MOUTH OF ULKUN DARYA

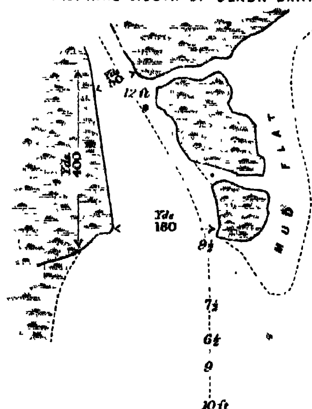


Diagram No 10

SECTION OF KULDUN



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numerous gulls and other aquatic birds hover and circle, in search of their prey. There is no reason for supposing that this pair of inverted cones has been excavated by the action of running water; and it seems only possible to class them as craters of extinct mud-volcanoes, like those of the Lussbeyla district, near the mouths of the Indus, or like the circular hollows left by the Calabrian earthquakes at the latter part of the last century, of which a description will be found in Lyell's 'Principles of Geology.' *

To return, however, to the Chartambye Channel. I was informed on the spot (and the statement meets with confirmation by an inspection of the Diagram No. 6, compiled after Boutakoff's sketch) that it had no existence a few years ago; and it has probably been formed by the effort made by the Amú to get rid of the increased discharge caused by the closing of Loudon. While passing on a caique immediately to the north of the Kashkanatao Hills, I was also told by a Kirghiz moolla, born and bred in the locality, that a dozen years previously he had walked over cultivated fields, which at that moment formed the bed of the stream on whose surface our boat was floating. There is no doubt, also, that Boutakoff in his explorations of the lower Amú passed over dry ground, which was traversed by the writer in a boat in 1874; but Boutakoff himself noted, in 1859, the commencement of the flooding caused by the closing of the Loudon Canal, since in some places he remarked the limpidity of the water (which was consequently almost stationary), and which allowed fields and irrigation channels to be seen through it. Besides Chartambye, the central lakes are fed by two other principal water-courses, called Karabailee and Oguz (Diagram No. 7), of which the last mentioned is the most westerly, and has probably been in existence for at least a century and a half, since on its banks, it is said, the unfortunate Prince Bekovitch was murdered by the Khivan Khan. I noted that this channel was entirely insufficient to carry the volume of water poured into it; and its depth, as the diagram shows, was out of proportion to its small breadth.

The lakes into which the above channels discharge, cover an area in the flood season of about 700 square miles. Individually they are sheets of water, varying in size from a few thousands of square yards, to 10 or 15 square miles, with an average depth of 6 or 7 feet, and a maximum one, in occasional places, of 30 feet. They are frequented by quantities of pelicans and

* It is somewhat remarkable that in many old maps of the Caspian, which include the basin of Lake Aral, two whirlpools are marked in a position approximate to that which would be occupied by the *phenomena* just described in a united Caspian and Aral basin.

other waterfowl, and are separated from each other by dense forests of rushes (*Arundo*), which rise to a height of 15 feet or so. Through this aquatic growth winds a labyrinth of connecting channels, where the water passes occasionally with a high velocity, and carries away the semi-floating islands on which the Karakalpak fishermen establish their temporary resting-places. The beds of the lakes and channels are covered with a thick growth of weeds, where the delicate *Miriophyllum* abounds, and from which the lotus of several colours rises to the surface of the water. On the islands, where a footing is only afforded by the interlaced roots of the rushes and other aquatic plants, may occasionally be found a fern, whose origin must probably have been in the high valleys of Badakshán, at the sources of the Amú, some fifteen hundred miles away.

The Central Arm of the Amú.—At their northern extremity the lakes which have been described, are drained by several large channels into the Ulkun-darya (Diagram No. 8) close to the point where that arm receives the Kuldun stream, coming from the south-west. Immediately below the junction, the Ulkun flows in a channel, having a breadth of about 600 feet, with a maximum depth of 30 feet, and carries in extreme floods a volume of about 1200 cubic yards per second towards Lake Aral. For about 25 miles this arm of the Amú flows due north, through an open country, where the left bank is more elevated than the right, which is swampy. The western bank is occupied by pastoral Karakalpaks in considerable numbers down to the Aral; and these people also occupy the strip of land between the river and the Lake, when the Ulkun turns westwards at Akkala, or the *White Fort.* The firmer ground, on the banks of the Ulkun, is crowded with cattle, grazing on excellent pasturages, which are interspersed with occasional patches of low scrub jungle, where hares and pheasants are plentiful. In the summer season, on the lower course near Aral, are numerous encampments of nomads, who during winter find shelter for themselves and their cattle in *zamoffkas,* or mud-walled enclosures, in which their scanty cereal crops are also stored. The cultivation on the banks of the river in this part is of a poor and limited description, and includes a few patches of rice and wheat, besides melon-grounds, watered by some small cuts from the stream. In addition to the *zamoffkas* mentioned, there are on the banks of the Ulkun a few deserted mud forts, which, with Akkala, formerly belonged to the Khiván Khanate.

The bar on the Kichkinĕ mouth of the Ulkun (Diagram No. 9) is situated at about 200 yards without the opening, and has a depth of about 6½ feet of water upon it. The mouth itself has a breadth of rather more than 150 yards, with a depth of

water of about 9 feet; but a quarter of a mile inside the channel narrows somewhat, while the depth begins to increase greatly. From the Lake, the south shore shows a line of low sandhills, and the edge of the water is occupied by broad masses of rushes, frequented by quantities of aquatic fowl. This growth of high rushes extends into the river itself, a distance of a few miles, and then gives way to cleaner cut banks, which rise slightly above the surface of the stream.

The Kuldun.—The Kuldun stream (Diagram No. 10), which joins the Ulkun, runs about 25 miles from Kungrad in a north-easterly direction. It skirts on the right extensive swamps through which the central mass of lakes can be reached; but its left bank is firm and high, and is usually covered with a thickish jungle, swarming with small game. On its upper course near Kungrad there is a good deal of cultivation, watered by the aid of Persian wheels worked by ponies. The Kuldun was ascended by Boutakoff in his exploration of the Lower Amú, when it carried a much larger body of water to Lake Aral than it does at the present time, which is probably not 100 cubic yards per second, even in high flood. Some six or seven dams were erected across it by the Khivans, and the remains of these are still visible at several points along the course of the stream.

The Elevations of the Lower Amú.—Near Kungrad the Kuldun contours the eastern foot of the Tumalaktao Hill, and has cut into the slope and exposed a soft bed of conglomerate of oyster-shells, cemented together with lime and sand, and coloured with bright red and yellow tints, which are probably due to iron. Among the shells and sand are numerous sharks'-teeth, and what appear to be the seeds of some leguminous plant. Circling round by the south from Tumalaktao, there are a few small eminences bordering the central lakes; and about 20 miles due east of Tumalaktao are the Kashkanatao Hills. They form an elevated plateau, whose general direction is north-east and south-west, along a distance of about 12 miles, and whose average breadth is about two miles. The hills are of an indurated clay formation of a buff colour, containing numerous fragments of *selenite*, and their slopes are strewn over with sand and small fragments of ferruginous sandstone. On the southern edge of the plateau are many detached hillocks of a regular rounded form, encircled with several parallel and horizontal water-marks, and with occasional narrow beach-like terraces, whose surfaces are of thin sedimentary layers, hardened with iron (?), and bearing very distinct ripple-marks, evidently due to rising and falling waters. The vegetation which occurs on the lower slopes of Kashkanatao is confined to a few prickly plants, such as *Lycium* and *Haliostachis*, fit only for camels to

feed upon. The greatest elevations of Kashkanatao and of Tumalaktao are probably not more than 100 feet, or a little more, in height. The cliffs of the Belitao range, which shut in Dowkara on the north, appear, however, to be somewhat higher, while their formation apparently contains more compact sandstone than either of those of the other hills which have been referred to. The summits of the elevations of the Lower Amú, as well as those on the banks of the river generally, are all used as cemeteries; a custom which has no doubt been necessitated by the hydrological conditions of the country about the shores of Lake Aral, and the physical phenomena which have attended the flow of the Amú-darya and other neighbouring rivers, since times of great antiquity.

Past and Present Character of the Amú.—In adverting to the changes which have taken place in the direction of the flow of the Oxus since the earliest historical dates, eminent authorities have seen no reason for supposing that the great natural features of the Aralo-Caspian region have so altered as to prevent decided conclusions being arrived at on the subject. Nor is the statement made by Sir Henry Rawlinson as to the recent entire desiccation of Lake Aral to be regarded as an exception to this proposition, for the emptying and filling up of the Lake are circumstances merely dependent on the flow of rivers, the outlets of whose courses have been frequently, and are now, easily modified by the action of man.

From the time of Herodotus (B.C. 458), who gives a short notice of the Araxe and the directions in which its two arms discharged, down to the tenth century of the Christian era, information regarding the Oxus is scanty. There is, however, sufficient to show that, at least as late as three-quarters of a century before Christ, the traffic from India to Europe passed down the river into the Caspian. Subsequently to this, the river seems to have adopted one of the northern channels, and to have entered Lake Aral at its south-eastern corner.* Previous to the fourteenth century the Oxus, or Amú-darya, again changed its course and flowed to the Caspian; and finally, towards the end of the sixteenth century, it abandoned that outlet, and discharged into Lake Aral near its south-western extremity.

The circumstances of this last change in the direction of the flow of the Amú-darya can be traced from the narrative of the English commercial agent, Anthony Jenkinson, which is to be found in Hakluyt; and from the references made by Abulgazee Khan of Khiva, in his 'History of the Mongols and Tartars,' to the old course of the river to the Caspian Sea. In this

* If so, its mouth was near the south-west corner, in the tenth century.

latter work, the country traversed by the Amú, south of Kunya Urgenj, is described as being, in the beginning of the sixteenth century, very fertile and very populous. In 1559 Jenkinson coming from the Caspian struck this old course, which then carried no water to its outlet; and advanced up it, to a point to which water still flowed. Continuing his journey past Kunya-Urgenj to Bokhara, and still ascending the river, he came to where the Amú-darya bifurcated; one branch being the Kunya-daryalik, up which he had travelled, the other being Ardok, the present course of the Amú-darya. Jenkinson arrived at the bifurcation of the Kunya-daryalik and Ardok in the first week of December, *i. e.* at the season of the year when the river carries little or no water, owing to its being ice-bound at its sources. He describes Ardok, however, as being "great and very swifte," which under the circumstances can only indicate that the Amú, embarrassed in its flow down Kunya-daryalik, was working to excavate a larger channel for itself in the direction taken by Ardok. That it eventually effected this, is shown by the narrative of Abulgazee Khan, who states that in 1575 the waters permanently changed their flow into Ardok; and that some years subsequently they enlarged a small irrigation canal, passing Túk, sufficiently to find their way by this course into Lake Aral. Before, however, this took place, there is reason for thinking that Ardok, *i. e*, the Amú-darya of to-day, flowed past Khodjeili to the east by Kukuzak (*vide* Diagram No. 4), and flooded the country lying to the south of the Belitao Hills.

Some light may be thrown on the causes of the changes in the course of the Amú-darya, which have been briefly indicated, by a consideration of the use to which the waters of the river are put to, in the Khanate of Khiva at the present day. This tract of country, which is situated on the left bank of the stream, and is watered by several canals flowing from it, measures some 200 miles long by 40 broad, and forms a fertile and highly cultivated oasis in the deserts of the Aralo-Caspian region. On the right bank of the Amú on Russian territory there is also a small strip of ground, about 50 miles in length, and 5 in breadth, which is cultivated in the same way. In about the middle of the month of March the winter begins to break up in the high valleys, where the sources of the Amú-darya are situated, and the melting of snows and of glaciers commences to throw an increased stream of water into the channel. The volume of water continues to augment, until the epoch of maximum summer heat, after which it gradually decreases again as the winter approaches. The annexed diagram (No. 11) shows the fluctuations in the level of the Amú-darya, which took place between the 23rd of June and the 10th of Sep-

tember 1874, and indicates the 3rd of August as the day on which the maximum height during that year was attained.*

The results of eight actual measurements of the Amú-darya, collated with the above record of its height during the period specified, have afforded data from which the following Table of the approximate discharges of the river has been compiled. It shows these in cubic feet per second; 1st at Toyuboyin, a point situated above the different positions of the irrigation canals which divert the waters of the river, and 2ndly at Núkús, below the same canals. The difference of the volumes passing these two points, will therefore be an approximation to the quantity used in the agriculture of the Khanate.

DATE.	Volume at Toyuboyin.	Volume at Núkús.	DIFFERENCE.
23 June	101,000	47,800	53,200
29 ,, ...	97,900	46,300	51,600
11 July	139,800	66,200	73,600
17 ,, ...	122,600	58,000	64,600
3 August	142,800	67,600	75,200
15 ,, ...	120,700	57,200	63,500
25 ,, ...	106,000	50,200	55,800
10 September	93,100	44,100	49,000
Average for 80 days	122,200	59,600	62,600

It results from the foregoing Table that during these 80 days of flood, about one-half of the whole volume of the Amú-darya was diverted by the irrigation canals of Khiva, leaving the other half to pass down towards Lake Aral.

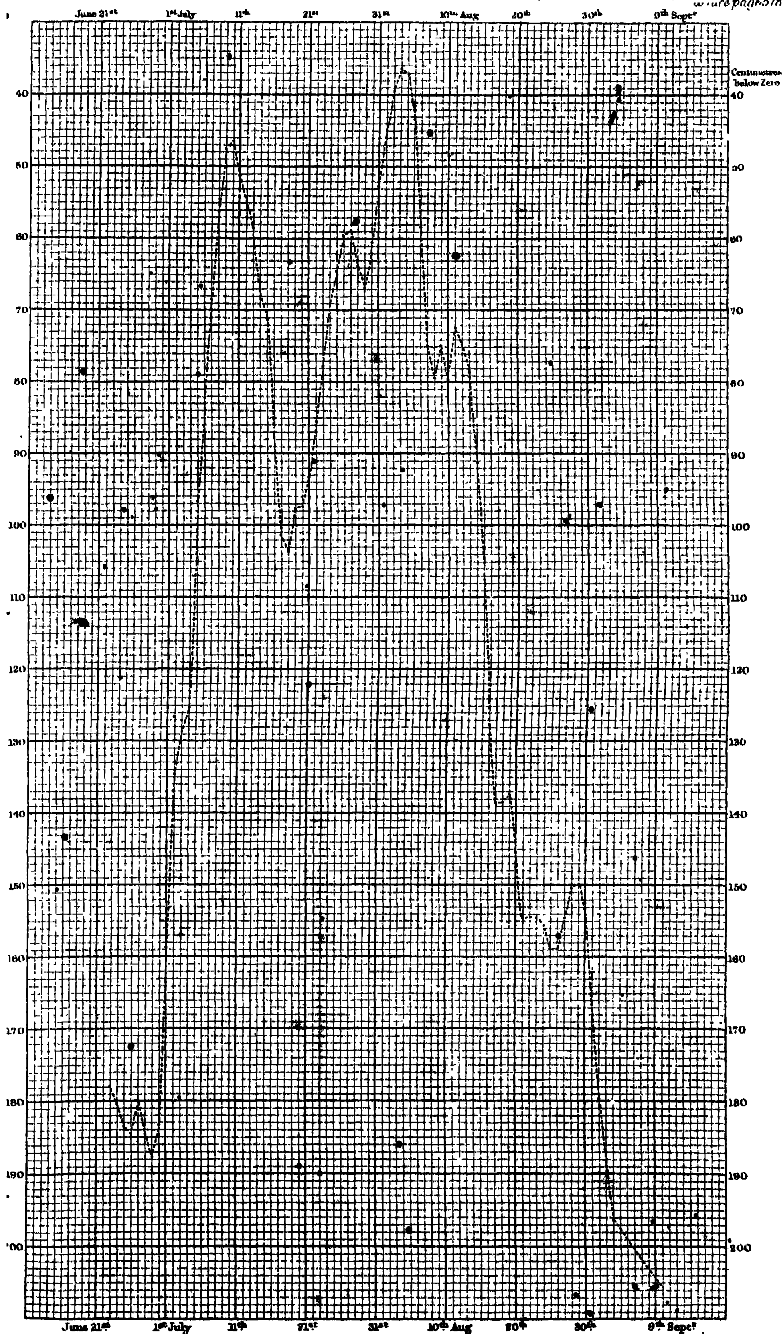
Now the natural conditions of the flow of the Amú-darya would be, that the volume and velocity of its waters are such as are sufficient to carry to the outlet of the river, the enormous mass of earthy matter thrown into its channel, at the melting of the snows and glaciers in the spring of the year. It appears, however, that in the Khanate of Khiva, half of the volume of the river is diverted into the irrigation canals, and each separate stream which flows in these, as well as that of the reduced main stream, passes on with a momentum proportionate to these diminished volumes. Some of their power of transporting the earthy matter being thus lost by the several streams of water,

* The lowest level was registered on 22nd March, 1875, at 297 *centimètres* below height of 3rd August, 1874. Probable low-level volume of Amú, 35,000 cubic feet per second.

Diagram No 11

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REGISTER OF HEIGHTS OF AMÚ DARYA FROM 23RD JUNE TO 10TH SEPTEMBER, 1874



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a portion of this burden, which they carried in suspension, must at once be deposited upon the beds of their channels.

General Ivanien states, that the earthy matter deposited in the irrigation canals of Khiva during a single flood season amounts to a depth of 2½ feet; and if this deposit were allowed to remain, it is evident the canals would soon cease to carry sufficient water for cultivating purposes, and would eventually become filled up and entirely useless for their purpose. At the end consequently of each flood season, an earthen dam is built across the head of each canal, to prevent the further entry of any water from the river, and the canal being in this manner run dry, the deposited sand is removed by manual labour from the channels, and heaped up along the banks. The dimensions of the canals are so preserved, and at the advent of the floods of the succeeding year, the dam is removed to allow of that water entering the several channels, which is required for the irrigation of the soil.

It is to be remembered, that while the yearly deposits are cleaned out of the irrigation canals, those in the reduced main stream of the river are left untouched and must accumulate, and this channel must consequently tend to be filled up, and so offer year after year increasing difficulties to the free passage of the floods to an outlet. On the other hand, since in the Khivan deserts no crops can be produced without water, and since a certain *minimum* quantity must be diverted from the river, to ensure the production of sufficient food for the population of the Khanate, it results that the levels of the canals, at the points where they leave the river, are placed at such a height as will ensure the entry of an adequate supply of water even in a year of *minimum* flood. In all other years, consequently, a larger volume of water enters these canals, than is required for the agriculture of the Khanate; and this excess, which would otherwise damage the irrigating works and destroy the crops, must be got rid of by the cultivators as speedily as possible. This is effected by leading or extending the canals into natural drainage channels, which flow down into the deserts westwards of the irrigated tract; and in every year except one of *minimum* flood, the canals thus drain down towards the Uzboy channel of the old Amú-darya, which flows southwards from near Lake Aral. The continued action of these circumstances during a long course of years, would gradually increase the volume of water passing by the irrigation canals, and add to the difficulties of a flow in the lower main channel of the river. This augmented flow would declare itself more particularly by some one canal, whose outlet might be in a more favourable position than those of the others, and the

natural consequence would be, that concurrently with the development of this canal, population and cultivation would increase along its banks. Eventually the flow of water down it, would overcome that down the old embarrassed bed of the main stream, which the river would consequently desert, in order to flow to a new outlet, and in this manner it seems highly probable, that the various past changes in the direction of the Amú-darya have been caused.

A few miles to the south of the point where the old channel Kunya-daryalik leaves the present course of the Amú, is another old dry bed flowing off to the westward through the desert towards Uzboy. Its dimensions are sufficient to justify the tradition, that it was the course in which the Amú-darya waters flowed before they passed by the Kunya-daryalik into Uzboy, and so on to the Caspian in the fifteenth and sixteenth centuries. Considering the previous direction towards the south-east corner of Lake Aral, which an early Arab geographer seems to assign to the Amú-darya, the presumption is suggested, that all the branches of the river, like the one which made its way by Túk into Lake Aral—Ardok, the Kunya-daryalik, the Doudon, and other former courses—were each of them in their turn nothing but an irrigation canal, enlarged and extended in the way which has been detailed. The continued application of this idea while ascending the course of the Amú-darya, would bring us to a point near Tchardjui, from where, the Turkomans living about Merv state that an ancient river-bed runs across the desert westwards to the Caspian. This apparently would be that one whose commencement was seen by Russian officers near Igdy Wells, some 200 miles east of the Caspian, in 1873; and might well be the one also, by which Indian merchandise passed from Balkh into Europe before the Christian era, since in this direction the waters of the Oxus would have run by the shortest line, to an outlet which is situated at the lowest possible point.

The Breadth, Depth, Currents, and Capacity of the Amú for Navigation.—The first sight of the Amú-darya in the flood season is a striking one. The great mass of water, coloured a yellowish-brown with its charge of earthy matter, flows on with scarcely a sign of that human life, which is so inseparably attached to the courses of most great rivers in modern times. The faculties of the spectator seem thus placed at once in sympathy with the legendary attributes of the ancient Oxus; while the mystery which has in times past invested the Khanate of Khiva may well be imagined as embodied behind the thick screen of planes and mulberries, following at no great distance the windings of the river on the western side.

On the bank opposite to the Khivan oasis, the sterility of

the Kizzilkoom desert is shut out from the river by the cultivation in Russian territory, or by the elevations of Shaikjaili and Bishtubye. The clay ridge of Bishtubye commences a little above and opposite to Khodjeili, and continuing some fifty miles along the right bank up the course of the Amú, runs into the lower spurs, of the sombre brown mass of Shaikjaili. These elevations continue about 10 miles further along the Amú, and then turn easterly to lose themselves 50 miles away by a long ridge in the Kizzilkoom. Their place on the river bank is succeeded by the cultivation in Russian territory, while this, in turn, is encroached upon by the desert, which at about 180 miles from Khodjeili touches the bank, and continues up the river. Here also the cultivation of the Khivan oasis ceases, and its place is taken by a high ridge of clay, passing almost into an argillaceous schist, which has been cut away by the stream, into a steep though not lofty precipice. Ten or twelve miles above where cultivation ends, is situated *Toyuboyin*, the "Camel's neck"; where the Amú-darya, flowing for a moment from the north, turns south-west, and rushes through a narrow passage, which the waters have cut through a bed of compact limestone. This dyke of rock has been tilted to a height of more than 20 feet directly across the direction followed by the river; its strike is about north-west and south-east, and the angle of its dip is perhaps 25°.

The breadth of the Amú, which is 1100 feet at this pass, increases along a distance of 20 miles downwards, to about 2500 feet. Here the breadth expands rather suddenly, and attains a maximum of perhaps 10,000 feet at Shurakhan, a distance of 40 miles below. It is along this portion, that the greatest quantity of water is diverted for the irrigation of Khiva; and the great water-spread of the river is here occupied by large alluvial islands, which are covered towards the end of summer with high, golden-eared, waving grass (*Lasiagrostis splendens*).

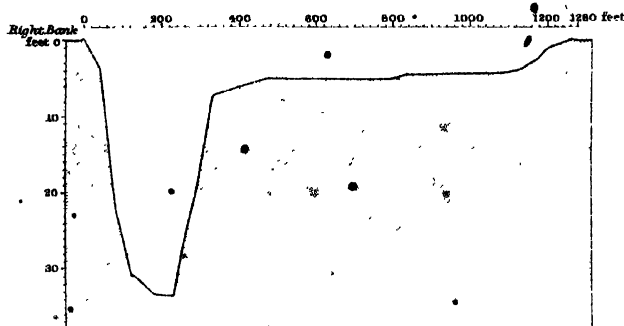
Continuing down the course of the river, the breadth then decreases, irregularly yet progressively, to about 1500 feet at Khodjeili; and lower down in its course to Kungrad to about 1200 feet.

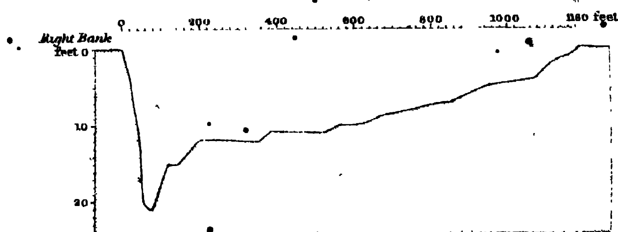
The depth of the deep-water channel of the river in the flood season varies from 15 to 30 feet in different localities; and its course is usually found either close to, or in the neighbourhood of, the right bank. The truth of this statement is, however, greater in those portions where the stream is not diverted for irrigating purposes. In ascending the Amú, the canals commence to be detached from the left bank at a few miles above Khodjeili; but they are numerous and larger between the 90th and 160th mile above the same place. In that portion, where the *maxi-*

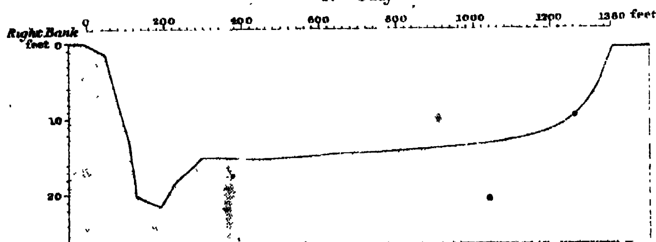
mum breadth is found, the deep-water channel not infrequently abandons the right bank, and winds in and out between the large alluvial islands. Below Khodjeili, where the river in its course to Kungrad takes a decided turn to the west, the deep-water channel passes from one bank to the other; and this is especially noticeable a few miles down, at Shireen Kala, where the ruined fort-wall on the left bank deflects the stream back again to the right bank, which it had previously left. Speaking, however, in general terms, the Amú-darya flowing in a northerly direction in the northern hemisphere, displays its obedience to the great astronomical laws; and its stream acting in conjunction with the earth's axial rotation, erodes its right bank in a very marked manner. Along this bank, consequently, the deep-water channel is usually found, as is exemplified generally by the succeeding diagrams, which represent the cross-sections of the river at several points.

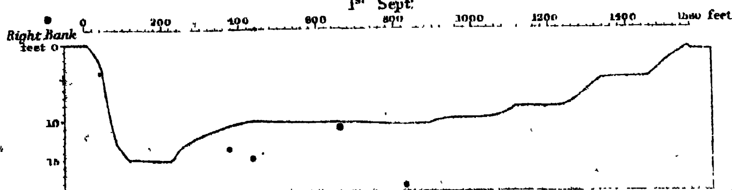
Diagrams Nos. 12 and 13 are cross-sections which were measured at a month's interval, near Khodjeili, a short distance below the branching off of Kuwan Jerma. Their general form is approximately a right-angled triangle, with the deepest part close to the right bank of the river, though in No. 12 the ravine-like portion is more marked than in No. 13; this results from No. 13 being situated nearer than No. 12, to a part where the volume of the stream was commencing to be deflected to the opposite bank. The pronounced form of No. 12 is that, which of necessity followed from the circumstances under which this portion of the Amú originated; it having been in the first instance nothing more than an irrigation canal derived from Ardok, which the yearly floods gradually extended past Túk into Lake Aral. It has been mentioned on a previous page, that before this outlet into Aral was formed, the waters of Ardok probably flowed by the Kukuzak (*vide* Diagram No. 4) into the low ground behind the Belitao. The closing of the Kukuzak at a subsequent date, and the barring of Loudon in 1857, were both circumstances, which at different times threw an augmented stream into the Amú, and caused the deep ravine-like form of the Section No. 12; since with an increased depth a larger volume of water could be passed off to an outlet more speedily than with an increased breadth. The same conditions have already been remarked upon, in reference to the form of the cross-section of the Oguz Channel (*vide* Diagram No. 7). Section No. 13 was measured about one month after the epoch of highest flood, and the depth of its ravine-like portion is probably diminished by deposits; Section No. 12 is, however, entirely free from such deposits, having been measured a few days only before the *maximum* height of the river was reached.

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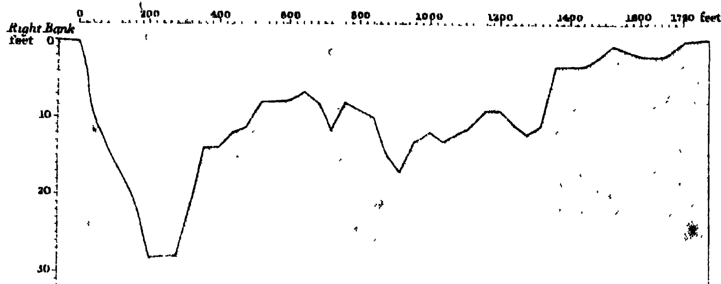


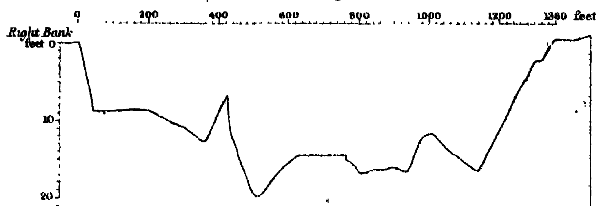


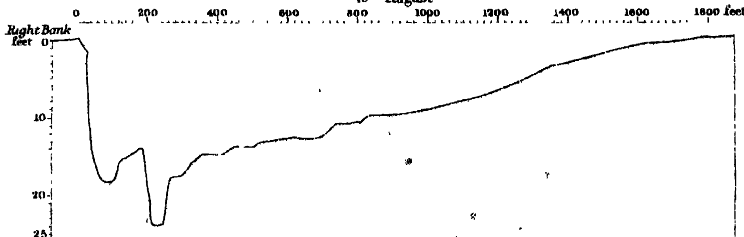
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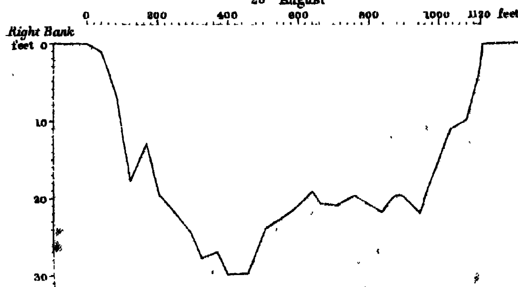
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Edwd Weller

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Sections Nos. 14 and 15 (*vide* Diagram), which were also measured at a month's interval in the vicinity of Khodjeili, but *above* the heads of the Kukuzak and Kuwan Jerma, show a similar contrast, which is probably due to the deposition of earthy matter by the stream. In these sections the ravine-like parts previously noticed are much modified, owing to the circumstance that this portion of the channel is of older formation than those shown in Nos. 12 and 13. In conformity with the general rule, the deepest part is, however, on the right bank. This also is observable in the cross-section No. 20, through the rock at Toyuboyin, though with some modification, since the course of the river is here temporarily directed to the south-west.

Section No. 16, which is situated 15 miles higher up the river than Nos. 14 and 15, conforms to the general rule, but shows a new modification of form caused by the detachment from its left bank of the irrigation canal Survolee, a short distance below. The stream has thus been divided into two distinct ones, leaving a ridge between them. This section is of interest as showing, in a restricted yet remarkable manner, that form which the bed of the Amú-darya assumes when a great quantity of water is diverted from it by irrigation canals. An excessive cross-section, in such a portion, would have a total breadth of perhaps 10,000 feet from bank to bank, and would be occupied by several islands, with shallow channels flowing between them, and the deepest of these would in general be found in proximity to the right bank of the river.

Section No. 17 is situated at about 17 miles above Khodjeili, and immediately below Bend, at the head of the now closed Loudon Canal. The section is remarkable as showing two distinct portions; one of about 400 feet broad, which is almost certainly still in course of being excavated by the stream, the other of about 950 feet in breadth, which probably represents the old channel while Loudon was still open and carried water from the river. From the circumstance that this section does not seem to have increased its depth notably, since the increased body of water, due to the closing of Loudon, has been poured into it, the inference, perhaps, may be drawn that the channel has excavated itself down to a stratum (of rock) sufficiently hard to cause the stream to act in preference on the indurated clay bank. In type it will be noticed the section approaches to No. 20, though it passes about one-halt only of the water which rushes through this latter one.

Diagram 18 represents a section of the Amú below Kipchak, and above where the canal Basoo is detached from the river. In it is noticed the increased breadth taken by the river where irrigation canals occur, though perhaps this breadth is slightly

exaggerated here, in consequence of the stream being deflected directly on to the right bank by some rocks on the opposite side, which act as a groyne.

No. 19 is a cross-section, measured at a point on the Amú, about 90 miles above Khodjeili. It is situated at some distance from irrigation canals, and the abnormal part of the section near the right bank is suggestive of an increased supply of water having been at a previous date turned into the channel at some point above it. It is just possible that the larger part may represent an enlarged section of Jenkinson's Ardok, while the portion nearer to the right bank is that which still remains to be excavated, in order to pass the added Kunya-daryalik stream with sufficient ease.

The velocity of the main stream of the Amú-darya and of its lower branches, in the flood season, attains in some localities to as much as 6 miles an hour, and is very variable. The variations of the current are due to the causes which will now be enumerated:—1. To the irregular slope of the channel, which varies from 11 inches to 3¾ inches per mile in its course from Toyuboyin to Lake Aral (Diagram No. 21). 2. To the diversion of a large volume of the river by the irrigation canals of Khiva, and to the consequent variability of the cross-section. In flood the broader reaches of the Amú become reservoirs in which the water is stored up, and in which the velocity is diminished; while that in the narrow reaches, connecting the reservoirs, is greatly increased. On the subsidence of the flood the general velocity of the stream becomes more equalised. To the above causes may be added the circumstance of the Amú-darya, in its passage to Lake Aral, passing through material of all degrees of hardness, from the limestone-rock at Toyuboyin, to clay formations more or less indurated, and interspersed with beds of sandstone. These materials, opposing as they do, different degrees of resistance to the action of the stream, sensibly modify the rate at which the enlargement of the channel is being effected, and consequently affect the velocity of the current. These irregular conditions of flow suffice to establish the conclusion that, even at the present day, more than two and a half centuries since the Amú-darya has passed by its present channel to Lake Aral, the ultimate *régime* of the river has not been attained. The actual amount of work executed by the waters, may be inferred from what has already been said regarding the enlargement of the Yany-Su branch; and will receive still further illustration when the present conditions of the Amú are compared with those obtaining in 1863, as they have been described by M. Vámbéry.

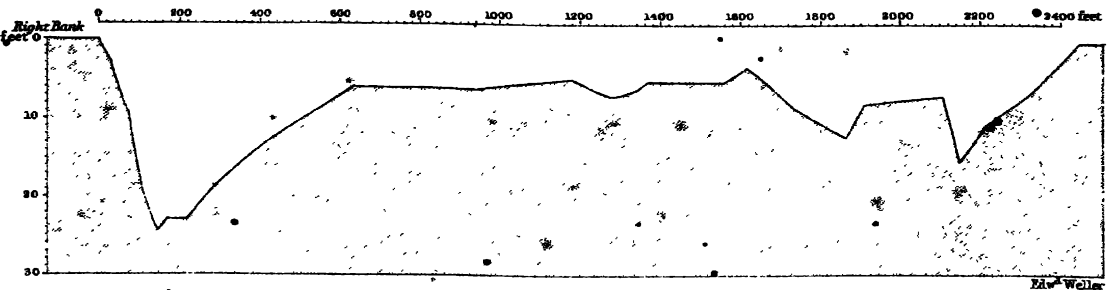
I had the advantage of observing the lower Amú-darya, both at the epoch of high flood and a month subsequently, when the

Diagram Nº. 18.

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SECTION, 40 MILES ABOVE KHODJEILI

13th August



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water-level had fallen five feet. At the latter date, in lieu of a single sheet of water, the broader parts of the river were encumbered with numerous exposed sand-banks, between which meandered the several channels, making up the total reduced volume of the Amú. In the narrower connecting reaches the river still flowed in a single unbroken stream, but with a diminished breadth and a moderate current, in place of that powerful body of water against which the Aral flotilla steamer, *Peroffsky*, in her ascent, could occasionally do no more than hold her own. This was more especially observable in the reach below the head of the Loudon Canal, since the closing of which, the necessary time has not elapsed to allow of a sufficient enlargement of the channel of the Amú below it. The inability of this part of the channel to carry the volume of water passing during floods is consequently very remarkable, and recals the process which must have been in operation in 1559 at the head of Ardok, when Jenkinson found that river "greate and very swifte," at a season of the year when the Amú-darya was carrying its *minimum* discharge.

The foregoing brief description of the strong and variable current of the Amú-darya naturally suggests a reference to its capacities for steam-navigation by the vessels belonging to the Aral flotilla. Up to 1873, these usually entered the Kichkinĕ mouth of the Ulkun branch, through which a landing-place at the western foot of the Kashkanatao Hills was reached. In 1874 an attempt was made to attain the main channel above, by passing from Kashkanatao up Chartambye, but without success. The *Peroffsky* then steamed out again into Lake Aral and ascended the Yany-Su into Lake Dowkara without much difficulty. She commenced the ascent of Kuwan Jerma, just as the Amú floods of 1874 were reaching their *maximum*; and the velocity of the stream and the numerous bends in the course of this arm of the river, made the ascent troublesome and slow. In the main channel above Khodjeili up to Shurakhan (which was the limit attained by the *Peroffsky*), a deficiency of engine power and of some local knowledge of the stream are the sole difficulties which stand in the way of steam-navigation during the flood season. With these qualifications, there seems no reason why steamers should not ascend, with tolerable ease, as far as Toyuboyin, 190 miles above Khodjeili; though whether the passage of the gap at the former-mentioned place is feasible or not is a question which a specialist only could answer decidedly. In any case, great address and powerful engines would be absolute requirements for the attempt; and even these being granted, a successful issue is doubtful, and I am inclined to hazard the opinion, that some years will elapse

before a steamer *steams* up through the gap at Toyuboyin. In descending the Amú-darya towards the subsidence of the floods, a steamer requires to use her engines chiefly in going astern against the stream, since the rapid deposition of sand and growth of shoals in the channel at this epoch, render it impossible to avoid running aground several times during each hour. Besides this grave inconvenience, the steam-navigation of the Amú has a further difficulty presented to it, by the scarceness and consequent cost of firewood,* which on this river is three times what it can be procured for at Fort Peroffsky on the Syr-darya, where it is most plentiful, and from which place the stores of fuel for the vessels of the Aral flotilla are drawn.

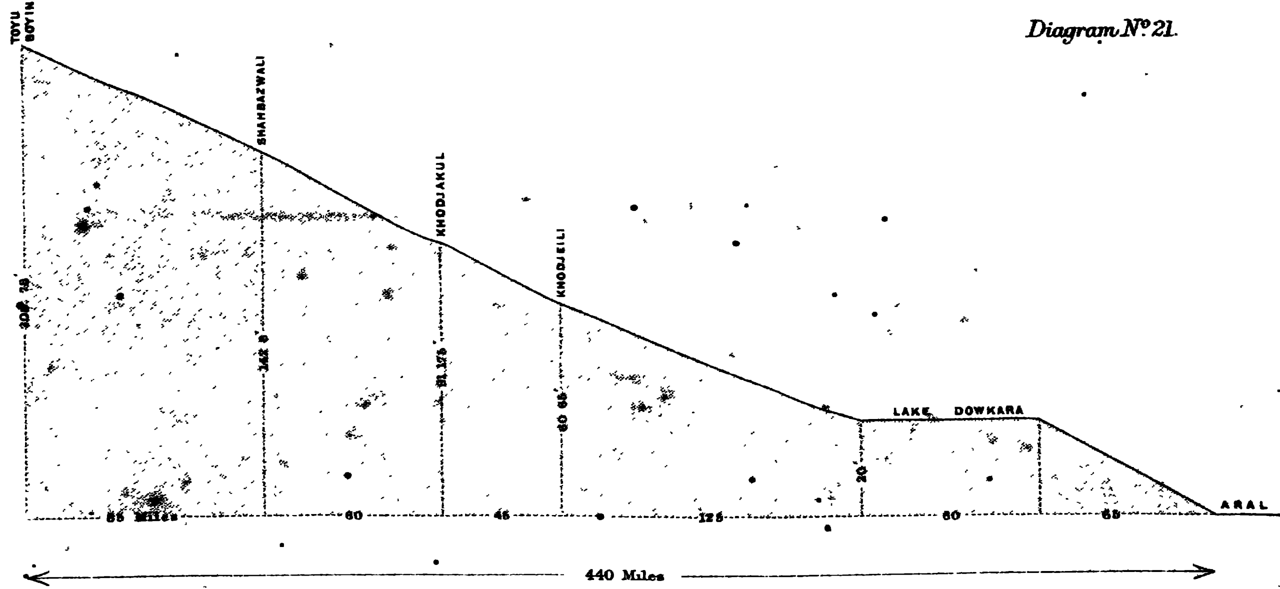
The Amú and Country it traverses for 190 *miles above Khodjeili.*—On the right bank of the Amú-darya, above the head of Kuwan Jerma, stands the small mud-walled village of Núkús, where there is a ferry by which the scattered population converges on Khodjeili on market days; and two or three miles to the north, on the bank of a channel detached from Kuwan Jerma, is situated the new Russian fort. The surrounding flat country has some little cultivation upon it, but is chiefly covered with tamarisk and other jungle peculiar to the banks of the river. This growth of *Eleagnus* and scrub acacia is especially thick, and of some size, a little to the east, about the old bed and banks of the Kukuzak Channel (*vide* Diagram No. 4); down which some small quantity of water still escapes from the river in the flood season.

In the description of the Amú-darya contained in M. Vámbéry's 'Sketches of Central Asia,' it is stated that a waterfall existed in the neighbourhood of Khodjeili, down which the stream rushed from a height of 3 feet with the swiftness of an arrow; this, the enterprising traveller very naturally thought, would be a great obstacle in the way of the navigation of the stream. It is beyond doubt that in 1863, the date M. Vámbéry refers to, the Amú-darya must have been working to enlarge its channel near Khodjeili, in order to pass off conveniently, the increased volume which had been thrown into it by the barring of the Loudon Canal in 1857. M. Vámbéry's description, however, indicates something more than this; and in another place he speaks of a "dam" at Khodjeili. What the obstruction referred to actually was it is difficult to say, since I could hear nothing regarding it at the locality itself; but it may be conjectured to have been, in all probability, an artificial spur, which had at some previous date been thrown out from the bank in order to shut up the Kukuzak. This channel was closed by the

* Say 1*l*. 10*s*. per ton.

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Diagram No. 21.



SECTION OF THE AMÚ DARYA FROM LAKE ARAL UP THE EAST ARM BY KHODJEILI TO TOYUBOYIN

Edwd Weller

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Khivan Khan to punish the Nomads living along its course, precisely as Loudon was closed to punish the Turkomans under the Chief Atta Murad Khan; and though I am unable to state the precise date at which the occurrence took place, this was sufficiently near to support the conjecture hazarded. It is certain the flow down Kukuzak has ceased in very recent times, and the work necessary to close this arm would probably have had the dimensions which M. Vámbéry's description of the dam at Khodjeili applies to it. In any case, the river has effectually swept the obstruction away, whatever it may have been, for no vestige of it remains at the present day.

Round the fortress-like village of Núkús, there is some cultivation and timber, but less than on the Khivan side of the river, where continuous groves of trees entirely hide the buildings of Khodjeili. To the south of this place, however, at a mile or two distant, a few scattered homesteads are seen among the crops, which cover the open country to a point opposite to Syed Atta Auliya, and which then give place to a scrub jungle for some miles further up the left bank of the Amú.

Syed Atta Auliya, 6 miles above Núkús, is the hill forming the northern extremity of the Bishtubye ridge, which more or less closely skirts the right bank of the river for 50 miles downwards from Shaikjaili. The ridge is very similar to the elevations of Kashkanatao and Tumalaktao which have already been described, and is of a yellowish-brown indurated clay, sprinkled over with sand and fragments of ferruginous sand-stone, of which thin *strata* still cap the isolated elevations occurring in some few places along it. The average height of Bishtubye is less than 200 feet, and increases towards its southern end, where it is lost in the lower spurs of Shaikjaili. Like most elevations on the banks of the Amú, the summit of Syed Atta Auliya is crowned with a *pisé* mausoleum, surrounded by a cemetery, which presents a curious appearance from the numerous wooden stretchers (used in carrying corpses to their resting-places) being placed vertically in the ground round the graves.

A little higher up the river than Syed Atta Auliya, but opposite to it, the first irrigation canal is detached to water the land round Khodjeili. At this point the river is broader than in the reach below, and the mouth of the canal is hidden among rushes and scrub jungle, a thick growth of which latter vegetation also covers the opposite bank, at the foot of the slope of Syed Atta Auliya.

In the reach immediately above, the river narrows again, and in the floods, the rush of water down this was exceedingly powerful. A month subsequently, the fall in the level of the water exposed a section in the perpendicular right bank, of some

feet of compact clay, which was superposed on a *stratum* of sedimentary rock of no great degree of hardness. About here the Bishtubye ridge retires a little distance from the river, and the flood-waters cover the intervening space with a marsh; which before very long time elapses, will be included in the channel of the Amú. This encroachment of the stream on the Bishtubye ridge is very observable all the way down from Shaikjaili.

Almost 20 miles above Syed Atta Auliya, but on the Khivan bank, is Bend, a fortress which was erected for the protection of the dam placed across the head of the Loudon Canal. Both fort and dam are hidden in the dense but moderately high *eleagnus* jungle, which covers the low left bank from Survolce upwards, and has obliterated the several old mouths of Loudon, save one, in which a small stream still flows to fertilise a limited area of land lying to the north-west of Kunya Urgenj. Bend is situated at the bottom of a broad reach of the river; and on the opposite bank, upon the Bishtubye ridge, here standing a mile back, is an elevation called Nogay Kala, from the circumstance of its having been occupied by Nogay Tartars, who fled hither after the taking of Kazan by Ivan the Terrible. From its summit the glaring sandy wastes of the Kizzilkoom are seen extending to the eastern horizon; but the eye finds relief to the south, where a sheet of vivid verdure lies between the bare clay slopes of Bishtubye and the river. This belt of jungle is no more than a mile or so wide at its broadest part; it is of a swampy nature, and is scarcely worthy of the name of "forest," which is applied to it in M. Vámbéry's work. Capping the summit of Nogay Kala are *strata* of ferruginous sandstone, between whose under edges, and the clay below, are some caves, haunted by owls of a very large size. On the open ground at the foot of the slope many fossil shells are to be found, including bivalves and *ammonites* of 18 or 20 inches in diameter. These gigantic remains are firmly embedded in the indurated clay soil, which atmospheric action has worn away around them, and so gives them the appearance of being the bases of ruined pillars; a circumstance possibly giving rise to a story current on the spot, that the locality was the site of an ancient city.

From Bend the jungle continues upwards along some 8 miles to a rising ground which the river has cut away into a steep escarpment, of about 30 feet high, on whose top is a small ruined fort. Behind the fort the ground rises to a few graves surrounding the mausoleum of Miskan Atta, a small domed structure in *pisé* work. At this place, close to the head of the broad reach at whose lower end Bend is situated, the river contracts somewhat, and on the right bank, a little above, is seen the fort-like homestead of Nuzr Khan, on some open

swampy ground near the water's edge. It belongs to a Kirghiz family, whose ancestors possessed themselves during a brief space, a century and a half ago, of the Khanate of Khiva, and whose submission at that date to the Czar, is held to have established the right of Russia to the protectorate of the territory at the present time. The head of the family now resides at Kaleechkala, among the semi-sedentary Kirghiz established near Lake Dowkara.

Up to the fort of Nuzr Khan the banks of the Amú can scarcely be considered either interesting or picturesque, and the monotony of the sand-charged stream itself is only very occasionally relieved, by the small caïque of a solitary Uzbek fisherman. At the point named, however, a change for the better occurs; for on the horizon the broken outlines and summits of the Shaikjaili range begin to declare themselves plainly, and in the middle distance the massive "Tower of the Jinn" frowns over the river from the summit of a low conical hill forming the extremity of a spur running down from Bishtubye. As this is approached, the jungle on the right bank of the river grows higher; while on the opposite side the highly-cultivated and thickly-timbered environs of Kipchak give an earnest of the Khivan oasis, which so far has been looked for in vain. Hereabouts are the heads of some irrigation canals, and opposite to these, upon some open ground south of the "Tower of the Jinn," stand the *madrissa,* built by Hajee Niazbye of Kipchak, and the *mausolea* of his family. These buildings are of a superior stamp of architecture, and, being constructed of burnt brick, must have cost a good deal of money. It is therefore to be hoped some steps may be taken to prevent the low ground they are situated upon being swept away by the stream; a circumstance which threatens to occur before very long.

The small town of Kipchak, with its flat-roofed, rather dilapitated, mud-houses, is surrounded with a high wall, and stands on a point of the left bank of the Amú, about 40 miles above Khodjeili. Under the town wall the river's bank forms a natural quay, whereon are piles of small timber used for building, and stacks of agricultural produce, and alongside which a few caïques float. At the extremity of the point of land are some rocks, deflecting the body of the stream to the opposite bank and cutting it away in the manner which has been mentioned. These rocks do not appear, however, to be now so marked a feature at this point of the course of the Amú-darya, as M. Vámbéry's description of them would lead one to believe. There is not the slightest danger to be apprehended from them by boats; and the inference is, that since 1863 the river at this point has enlarged itself considerably.

The Amú preserves its breadth for 16 miles above Kipchak to the commencement of the Shaikjaili range, and along the same distance the Bishtubye ridge, which, opposite Kipchak, lies perhaps 3 miles back from the river, gradually approaches it again to lose itself in the northern spurs of Shaikjaili. On the crest of the ridge, not far from the hills, stands a large squat *pisé minár*, one of two prominent landmarks, whose erection is attributed to the expedition of Prince Bekovitch; the second *minar* stands some 15 miles further up the river, on some high ground on the same bank.

The country close to the Amú, on the Khivan side, between Kipchak and a point opposite to Shaikjaili, is uncultivated, but a little way back it is studded with clumps of trees, and homesteads are scattered among fields, covered with crops. On the right bank, above Kipchak, there is a plantation of moderately-sized timber, and farther on some open ground, a part of which is occupied by Lake Karakool. This the river threatens to absorb into its channel, and a small-domed mosque, with its surrounding cemetery, which are situated close by, are likely to share the same fate. At this point the Amú-darya has cut away a low ridge, and has left a bank of about 10 feet high, whose erosion is assisted by the fact of the clay composing it being filled with isolated masses of sand. This the running water washes out and caverns are formed, whose falling in, from time to time, hastens the destruction of the bank. The river acts with great power against its right bank about here, on account of the *momentum* it has acquired in the narrower reach above, which skirts the foot of the Shaikjaili range. The commencement of these hills occurs at about 56 miles above Khodjeili, on the right bank of the Amú, where a small mosque is situated close to the edge of the water.

The Shaikjaili hills, rising rather abruptly a few miles away to the east of the river, receive the Bishtubye ridge among their lower and northern spurs, and then turning with increased height southward, along a distance of 5 miles, skirt the Amú, which at the foot of the slope has a breadth of less than 3000 feet. To the west the hills present a massive group, perhaps 3000 feet high, of a sombre brown colour, which approaches in some parts to deep neutral tint, and has a greenish tinge, as if produced by coal-dust. Their formation is metamorphic, and the rock is sprinkled with glistening points, while larger pieces of the same nature crop out in irregular and tilted *pseudo-strata*, more especially at the rounded shoulders of the ravines, which separate the component buttress-like portions of the central mass. Here and there are light-coloured patches, whose fallen *detritus* forms heaps, at the base of the steep slopes

on the river's bank below. At the southern extremity of their river-face the hills turn eastward again, and stretch into the Kizzilkoom desert by a long ridge, which gradually decreases in height to its termination in the east. A line of clay-elevations, which seem to be the southern prolongation of Bishtubye, and through which perhaps the Shaikjaili group was upheaved, continues along the bank of the Amú, for a distance of 10 miles farther, from where the hills turn eastward. Over these clay ridges are seen the higher ones thrown out from Shaikjaili in a southerly direction; and remarkable contrasts of colour are afforded by the intermingling of the darker spurs with those of the yellow clay, giving the idea of trees and clumps of massive timber. I mention this, since it shows how M. Vámbéry fell into the error of describing these elevations as being thickly covered with forest; and, I may add, some careful use of a field-glass was necessary before I could divest myself of a similar erroneous notion.

At the southern end of the river-face of Shaikjaili, and close to the water's edge, stand the picturesque ruins of an old fort, called Yampuk, and on the opposite bank are some hills of no great height, of apparently the same formation as that of this metamorphic group. In speaking of the Amú at this point, M. Vámbéry states, that here the waters roar as if the Oxus, that unruly son of the desert, were angry at being so imprisoned between the rocks; and the navigation in the reach below is described as being dangerous from the force and rapidity of the current. It is sufficient to note, that this description is by no means applicable to the locality at the present time; its value, however, is great, as it illustrates in a forcible manner the work the Amú has executed in enlarging its channel since 1863.

Up to Yampuk both banks are capable of being examined from the deck of an ascending steamer; but along a distance of 90 miles further to Tunuklu the breadth of the Amú is too great to allow of this being done; and the channel winds in and out between large islands, so that either the one or the other bank only is occasionally seen. Such glimpses are, however, sufficient to show the striking change of physical aspect which has been effected by the waters of the Amú, in transforming the sterile clay desert into a smiling and highly-cultivated garden. In Khiva irrigation is generally employed, and the country is covered with cereal crops, lucerne or cotton, which alternate with melon-grounds and fruit-orchards. Silk-culture is extensively practised, and the mulberry abounds among groves of other cultivated trees, shading the numerous neat homesteads which are scattered along the banks of the irrigation canals. On the more elevated Russian bank irrigation is less extensively

emloyed, it being in the neighbourhood only of Sháhbázwáli and Shurakhán, that the Khivan standard of fertility is in any way approached. However, the whole of the right bank of the river, for some seventy miles, is also redeemed, by the beneficent waters, from the state of utter sterility it would possess in the absence of such an advantage. On the less cultivated portions and on the alluvial islands numerous flocks of sheep and cattle are grazed and tended by shepherds, who are assisted by crop-eared, short-tailed, European-looking dogs.

On account of the agricultural avocations of the population, the homesteads are scattered over the surface of the country, and villages consequently are unknown, while towns are few and generally undiscernible from the river. At Sháhbázwáli, on the right bank, there is, however, a collection of buildings near a tall *pisé* minar, of the usual massive Khivan form; and a little way off is a large-domed mosque, surrounded with smaller ones. These, together with the town of Kipchak and the *madrissa* opposite to that place, are really the only buildings of which a good view is obtained on the Amú; a few homesteads and ruins being, of course, excepted from this statement.

The Russian territory is situated on the right bank, commencing from the mouth of Taldyk, in Lake Aral, and continuing to Meshekli, more than 200 miles above Khodjeili. Meshekli is on the new frontier-line of Bokhara, and past here, for 40 miles, to Tunuklu, the Amú-darya flows in a narrow valley, into which local tradition says the river was artificially turned by a former ruler of the country. This narrow valley is bordered by low clay (?) hills, up to which, on the right bank, the Kizzilkoom desert extends. Twenty miles below Meshekli is situated Toyuboyin, the "Camel's neck," where the river, with a breadth of 1100 feet, has been already described as bursting through a bed of compact limestone, which is filled with small shells. Ten miles below Toyuboyin the river issues on the open country by the "Lion's mouth;" and here is situated the fort of Tunuklu, upon an elevation forming the northern extremity of the high clay ridge which the stream has cut into a steep escarpment, varying from 10 to 50 feet in height, on its left bank. Between Toyuboyin and Tunuklu the Amú-darya expands in breadth generally in its descent, and 2 or 3 miles below the former place the centre of the stream is occupied by the pretty alluvial island of Aral-chee-bábá Auliya, whose area of some 15 acres is thickly covered with willows and poplars.

Below Toyuboyin, along the right bank, extends the line of low sand-covered hills to a point nearly opposite to Tunuklu, and here a ruined mud-fort also occurs. From this down to

Sháhbázwáli the Amú expands in breadth enormously, and the islands along the same distance increase in size. From the same point the great irrigation canals commence to be diverted from the river on both sides; and the great fertility, which is the characteristic of the Khivan territory, is not without its parallel on the right bank, where a strip of country, some 50 miles long and 5 miles broad, has been reclaimed by irrigation from the sandy desolation lying to its east. In addition to the half-drowned lands traversed by the lower courses of the river, this cultivated area may be said to be the only habitable portion of the Russian possessions on the Amu-darya.

The chief Russian position in the Amú-darya district is at Petro-Alexandrofskiya, a walled garden, near the town of Shurakhan. Petro-Alexandrofskiya is in nearly the same latitude as Khiva, and about 30 miles east of it; and the verdure and leafiness of the place form a wonderful contrast with the sterility which lies at its very postern gates. The country between it and Shurakhan is a tract of desert, across which run what strongly resemble old canals; and some way to the north, at the foot of the slopes of the southern face of Shaikjaili, is an old river-bed of large size, which at some ancient date must also have carried water towards the west.

Notes on the Lower Syr-darya.—The Syr-darya, or ancient Jaxartes, has been described sufficiently on several occasions to make it unnecessary in the present note, to do more than allude in general terms to the direction of its flow and the country it traverses; the chief object in view in what is about to follow being to apply to this river, the principles deducible from the study of the Amú-darya, with the intention eventually of passing on to a consideration of what the state of Lake Aral, the recipient of the waters of the two rivers, may have been at different epochs in past times.

The Syr-darya, flowing in a general direction from east to north-west through 17 degrees of longitude, takes its rise in Russian territory, among the high valleys of the Thian Shan, which lie to the south and south-west of Lake Issik-kul. Nearly 400 miles below its sources it enters the Khanate of Kokand, and crosses that country in a south-westerly direction along a distance of 250 miles. Entering Russian territory again, it soon makes a remarkable turn and flows almost due north through six degrees of latitude, after which it changes direction once more, and flows westerly, with northing, in a rather meandering course, along a distance of more than 400 miles to its mouth in Lake Aral.

The turn taken by the Syr-darya to the north below Khodjend, where it fairly emerges from the hilly country into the

plains, is remarkable for the following reason. Fort Peroffsky being about 239 feet above the level of Lake Aral, and 400 miles distant from the mouth of the river, the fall per mile in this part of its course is 7¼ inches. Applying the same rate of fall to 850 miles of the Syr, up to a point somewhere below Khodjend, we find the height of this point to be 580 feet above Lake Aral. From here along a line to the south-east corner of the lake would be a distance of about 600 miles, and a river following this from Khodjend directly westwards, would have a fall per mile of 11¾ inches. The actual course of the Syr, which has the lesser slope of 7¼ inches per mile, consequently suggests very strongly that it has been artificially produced.

It is to be noted that the fall of 11¾ inches per mile which has been indicated for this ancient and natural course of the Syr, is almost identical with that which the Amú possessed when it ran in its most ancient course westwards, from some point near Tchardjui to the Caspian Sea. This identity of fall is what might have been expected, from the similar conditions of the flow of the Amú and of the Syr, which are in flood, from the melting of snows at their sources, during the spring and summer months, and whose small autumn streams are still smaller in winter. The analogy between the rivers might be pursued by considering that the Amú does not at the present time receive affluents such as the Zarafshan and the Murghab, which formerly reached it; while it seems certain that many streams such as the Demus and Baskatis of Ptolemy, which have now disappeared, formerly contributed their waters to the Syr. The changes which we know to have taken place in the flow of the Amú, and the identity of use to which its waters and those of the Syr are applied in countries having a similar geological formation, may reasonably permit us to suppose that similar phenomena are likely to have occurred in the flow of the Syr.

A consideration of the incidents which occurred during the Macedonian expedition on the banks of the Tanais, or Jaxartes, as recounted by Arrian, point to the conclusion that Cyropolis, which was the extreme north-east point reached by Alexander, was not situated on the bank of the present Syr-darya as has hitherto been generally supposed. The position of this city is sufficiently indicated by the circumstance, that Alexander returned from it by forced marches, both with infantry and cavalry, to the relief of Maracanda or Samarcand; and reached the neighbourhood of that city early in the morning of the fourth day after starting. The distance he made with his troops during those three days of forced marching could cer-

tainly have not been more than 100 miles, measured as the crow flies, even over the most favourable ground. But in passing from the valley of the Tanais to that of Politymetos, in which Maracanda was situated, the Macedonian forces would have crossed either the Nouratintao or the Sanzartao range of hills which intervened; and supposing this to have been done at the easiest point, *i. e.* by the pass immediately to the south-west of Djizzak, it is clear that at least three days would have been required to march the distance between Cyropolis and Maracanda, which could not have been equal to less than 120 miles, over level ground. Now it is 140 miles, as the crow flies, between Maracanda and the nearest point of the course of the Syr-darya of to-day, by a line drawn straight across the Sanzartao range; and this distance would be something like 170 miles through the pass which has been mentioned, and which would have been at the same time the easiest and the shortest line to follow. Nearly a week would have been absorbed in marching this distance, a circumstance which at once offers insuperable objections to the supposition that Cyropolis could have been situated upon the present course of the Syr-darya. A further reason indicates that Cyropolis should be placed at the shortest possible distance from Maracanda which Arrian's history will allow of, since we are told that Spitamenes, having broken up his camp before Maracanda at the approach of Alexander, was pursued vigorously by the relieving forces; and this circumstance, however credible it might have been after a forced march of 120 miles in three days, would have been utterly impossible to execute after one of 170 miles in the same space of time. All the considerations which have been detailed afford good reason, consequently, for placing Cyropolis within a curve described from Maracanda as a centre with a radius of 100 miles, and the curve falls short of the present course of the Syr by 40 miles.

Arrian states that the river on which Cyropolis was situated usually ran through it like a torrent, but that when Alexander took the place, this channel was dry. The river might therefore have been either an affluent of the Tanais, which was liable to sudden floods from rains falling in the neighbouring hills, or on a bed of the Tanais, from which at no very distant date previously the flow had changed into another channel. Such a change, it has been established from a study of the Amú-darya, could result from the waters of the Tanais having been employed for irrigation purposes; and since Cyropolis was the greatest and most populous city of those regions, there is reason for assuming that cultivation, aided by irrigation, was extensively practised in its neighbourhood. We know that the

waters of Politymetos in the adjacent valley were largely utilised at that date in the same way; and the ability of raising large supplies of food was the necessary condition of the existence of masses of population.

Arrian further relates, that the European Scyths assembled in large numbers in the neighbourhood of Cyropolis, on the opposite bank of the river, which at this point had no great breadth, and that they threw their javelins across and made insulting speeches to the Macedonians. The temper of Alexander being roused thereby, he ordered the hides which covered the soldiers' tents to be prepared, and used them to ferry his troops over the river, which, though narrow enough to throw a javelin across, was deep enough to be unfordable.

The present Syr-darya, at its entry into the plain west of Khodjend, has a minimum breadth of 300 yards, which would be a great deal too broad for javelins to be thrown across. And this narrowness which was possessed by the Tanais of Arrian, in conjunction with the fact that it was not fordable, seems to indicate that it was an artificial channel carrying a deepish body of water. The characteristic conditions of the natural main channel of the Syr-darya would be precisely the opposite of those of the Tanais. Wherever the Syr of the plains might be narrow enough to allow of a javelin being thrown across, it would be fordable; but if it was not fordable it would be so broad that javelins could not be thrown across it. The various considerations which have been specified, all point to the conclusion that Cyropolis was not situated on any point of the present course of the Syr-darya, but that it was either on or in close proximity to, a course which must have passed along the line I have suggested as the ancient line of the river to the south-east corner of Lake Aral. A reference to the map will show that the small affluents of the Syr-darya, flowing from the hills above Tashkend, would have reached this ancient course in a much more natural manner than by the acute angle which they make with the direction in which the river flows to-day. And it may be mentioned, before leaving this part of the Syr, that in the end of 1874 the excavation of a large canal was commenced, in view to the fertilisation of the steppe lying between Chinaz and Djizzak; this canal must have approximately, the direction of the old line which has been assigned for the Syr-darya, and its operation may not improbably influence the present flow of the river in an important manner.

The physical details which have been described as governing the flow of the Amú apply in all their extent to that of the Syr, since this latter river also carries during the spring and summer months a volume of water which is very greatly in

excess of the quantity flowing in the autumn and winter of the year. During the latter period the river runs in a channel, by which probably a volume four times greater has recently been passing; the stream is consequently embarrassed with shoals, while its velocity is low and its depth is small. During this epoch canals can be excavated in such positions as would, on the advent of the floods of the succeeding year, ensure the passage of a large body of water into them, and the set of the stream having been thus influenced, no long time would elapse before the entire volume of the river might be compelled, with no great difficulty, to take the new direction of flow. It is by these artificial means that the flow of the Syr, by the Jani-darya and by the Kuwan-darya, as well as that by the Karauzak, have in all probability been caused; and the ease also with which a dam can generally be constructed across the Syr at low water, enables the flow by most of such channels to be stopped at will. In this way, both the Jani-darya and the Kuwan-darya have been barred at their heads, though an attempt to close the flow by Karauzak in the manner usually resorted to, has failed of success in this case.

I am not aware that the limited number of irrigation canals which exist on the lower courses of the Syr have their heads dammed and their beds cleared of deposit, in the manner those operations are annually carried out in the Khivan Khanate. The difference of treatment probably results from the irrigation on the lower Syr being on a very much less extensive scale and unmethodical; and is also perhaps due to the different ethnic characters of the respective populations, who have inherited different traditions from their ancestors. If the laborious system followed in Khiva had been in use in the valleys of the Talass, of the Tchui, and of the Sary-Su, it is probable that those streams might flow to definite outlets in the Syr-darya, instead of being dispersed and terminating in the sand. The Kenderlik, a river which has entirely disappeared, though it is expressly mentioned in Russian information of the 16th century, and many streams from the northern slopes of the Karatao range whose waters are lost in the steppes, would also under different conditions have swelled the volume of the Syr-darya. And, speaking roughly, it seems probable that in ancient times the drainage of these regions might have been double that of the volume of the present Syr-darya. The water so carried westwards to Lake Aral seems, according to the theory propounded in this note, to have passed by two rivers;* one of which flowed from the present sources of the Syr past Khodjend, and which, in its passage directly westwards below that

* Early Arab geographers specify three rivers, as entering Aral from the east.

place to the south-east corner of Lake Aral, would have received the waters of the Demus, the Baskatis, and other streams mentioned by classical geographers. The second river would have been formed by the confluence of the Arys, the Talass, the Tchui, and the Sary-Su ; and probably had its mouth somewhere about the Kuwan-darya, in a Lake Aral, whose height would have been higher than that of to-day. Such an increased water-spread as is here mentioned, would have included in its perimeter all the salt lakes, great and small, which at the present time are scattered over the country north of Lake Aral, and which are fed by the Irgeez and numerous water-courses from the eastern slopes of the Mougojar Hills, and by the Tourgai, and many other streams which run down the southern and south-western slopes of the low watershed at the sources of the Tobol, of the Ubagan, and of the Ischim. Such supplies would have more than met the evaporation from so large an extent of water-spread, more especially if it be considered that these different physical aspects would probably have been accompanied by a diminished dryness of climate, and an increased vegetation upon these now bare and desolate regions.

At the present day the Syr at Fort Peroffsky has a breadth of about 500 yards, which is diminished to about 300 yards at Cazalinsk; and the depth, which is usually 20 feet in the channel between Chinaz and Peroffsky, lessens to about 6 feet at a *maximum* at the mouth of the river in Lake Aral. Here, also, the breadth is much diminished, and an estuary is occupied by marshes, which have been formed by the earthy deposits of the stream and by the desiccation and consequent retreat of the limits of Aral.

I had no opportunity of measuring the discharge of the Syr, but I estimate roughly, that it contributes to Lake Aral a volume of about one-half that supplied by the Amú-darya. From Fort Peroffsky downwards (and in addition, I believe, upwards to Chinaz) the banks of the Syr-darya are low, and the river frequently inundates large stretches of the neighbouring country. The greatest quantity of water thus lost by the Syr, occurs in the marshes formed after the division of the river, which takes place at about 10 miles below Fort Peroffsky. Here the Syr-darya forms two branches, the left of which, the Jaman-darya, was formerly the main stream; the other and right branch, the Karauzak, was accidentally formed, some fifty years ago, from the enlargement of an irrigation canal by the flood of the river. Before uniting again with the Jaman-darya, at about 100 miles further westwards, the Karauzak forms extensive marshes, the evaporation from whose area, alone, probably absorbs a volume of 200 cubic yards per second throughout the year. At a few miles below this division of the Syr the Jaman-darya gives off

the Kuwan-darya from the left bank, and this old arm of the river runs parallel to and some few miles south of the present course, towards Lake Aral. At this day the Kuwan-darya carries little water, and such as enters it is lost on marshy ground near its commencement and in a salt lagoon, which is situated in the country east of Lake Aral.

At 7 miles below Fort Peroffsky the old Jani-darya course leaves the left bank of the Syr, and runs south-west to the dry Lake Kouktchatengis along a distance of more than 200 miles. Towards its commencement its dimensions are not very much less than those of the present Syr-darya; but near Kouktchatengis it gives off one or more branches to the right towards Lake Aral. East of the meridian of Kouktchatengis a large dry river-bed can be traced, running towards Lake Dowkara, along the depressed country situated to the south of the Belitao range of hills; and this river-bed also throws one or more arms towards Lake Aral, at its south-east corner.

The Jani-darya from the Syr to the meridian of Kouktchatengis has a slope of about 8½ inches per mile, and eastwards from this to Lake Dowkara of about 6 inches per mile. At the present day a little water, which passes probably by the overflow of the Syr, is found in the upper course of the Jani-darya; but no regular discharge takes place by it, as its head was dammed subsequently to 1816, in which year Mouravieff says it carried a stream of water. This, however, was probably not a permanent state of things, since Mouravin had seen no water in the Jani-darya in 1740; and it is generally stated that the flow of the Syr by this bed ceased about a century and three-quarters ago, at which time its head was probably situated some distance eastwards of Fort Peroffsky. It seems indeed certain that, in the fourteenth century, the Syr flowed along this line from somewhere near Otrar, at the mouth of the Arys, since the route from Kunya-Urgenj passed in a north-east direction from the south shore of Lake Aral to that emporium of trade.

At its upper end the banks of the Jani-darya are clothed with a tolerable quantity of pasturages and scrubby jungle growths; and extensive stretches of country, liable to inundation, are thickly covered with rushes. Signs of desiccation, however, become rapidly more and more apparent, as the course of the dry river is descended, until, in the neighbourhood of Lake Kouktchatengis, the large saksaul trees which cover extensive tracts of country, are all either dead or in a dying state. From about here the country eastwards begins to present the aspect of a tumbled mass of low sand-hills, of which the lines can be distinguished, running in a general northerly direction. Between these, bare tracts of hard clay occur, which seem formerly to have been covered by floods from the Jani-darya, or are the dry

beds of shallow bays and lagoons which appertained to Lake Aral at a high level of about 50 feet above that of to-day. The desiccation of the country reaches a maximum near the meridian of Lake Kouktchatengis, and the country situated between this dry lake and Aral presents great difficulties to the student of physical geography. For besides the dry bed of Lake Aral, with different water-spreads, the ground is cut up by the channels through which the Oxus, the Jaxartes, and the Syr emptied themselves into their receiving basin at various epochs; and from some neighbouring point, probably at the south end of Lake Kouktchatengis, the Kizzil-darya (*vide* Diagram, No. 22) must have passed across this country which is situated on the right bank of Kuwan Jerma,* and the aspects of which are described in the Notes on the Amú-darya. The Kizzil-darya course could not, however, have remained long in existence, since, owing to the small slope of 2½ inches a mile, which it could at the most have possessed between Kouktchatengis and Kunya-Urgenj, it would have been speedily choked up with sand, unless it was kept open artificially. This desiccation of the Kizzil-darya course agrees, it may be remarked, with the statement in Baber's 'Memoirs,' that the Syr in his day, terminated in the sands of the desert; and the well-defined river-bed which traverses the country immediately to the south of the Belitao Hills is suggestive of the idea that this is the last channel which carried the waters of the Syr westwards, from the north end of Kouktchatengis, before the river had its present outlet on the north-east coast of Lake Aral.

The waterless steppe which lies along the 120 miles of country separating the meridian of the dry Lake Kouktchatengis from Lake Dowkara, on the lower courses of the Amú-darya, presents the extremest degree of desolation. Its surface is for the most part a bare and glazed clay plain, which is evidently the dry bed of a former shallow sea; over this there are occasional tumbled masses of low sand-hills, and across it runs a deep, large dry river-bed, possessing well-defined banks, which must have carried a body of water nearly equal to that of the whole volume of the Syr. The northern limit of the steppe is a regular and continuous line of low hills, which form little more than a high bank of indurated clay at the eastern end, but which, towards the west, become more variable in direction and in appearance, and more elevated until, on the north of Lake Dowkara, they present a sandstone cliff of some two hundred feet in height on their southern face.

From Kaleech-kala, which is situated just on the south of Lake Dowkara, a channel, called Karakool, flows from Kuwan Jerma

* That is, if the Syr water ever passed into Uzboy.



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in a north-easterly direction and loses itself in the sand, after a course of about 20 miles. The moisture carried by this channel feeds a certain limited amount of vegetation along this distance; but eastwards from its termination, to where the main Jani-darya bed is met near Kouktchatengis, there are scarcely enough scattered prickly shrubs to support even the camels passing by this route, or the few goats of the occasional Kirghiz who wander in these regions.

Notes on Lake Aral.—The annexed chart of Lake Aral which is a reduction of that compiled from the surveys made by Admiral Boutakoff in 1848, has traced on it approximately, the several contour lines of 4, 8, and 12 fathoms below the surface. By a careful transfer of the outline of the lake and of these contour lines, from the Russian Admiralty Chart, I have calculated the various quantities, which I shall give in this note, and which I procured in the following manner. First cutting out all the islands included by the water-spread of Lake Aral, I weighed that sheet of paper in a delicate balance, and went through a similar process for each water-spread included by the contour lines drawn at the several depths. Comparing these weights with the known areas and weights of two bands of paper cut from the whole water-spread of the lake, one from north to south, the other from east to west, I found the area of Lake Aral included on the chart of 1848 to be 24,536 square miles. This quantity is in agreement with Colonel Veniukoff (whom M. Elisée Reclus has followed), and who gives 1207 German geographical miles, or 25,540 square English miles, as the water-spread of Lake Aral; but it differs from that of Malte-Brun, who states the area at 1280 leagues, or 17.000 square English miles. The areas included by the 4 and 8 fathom contour-lines were found to be 18,304 and 13,297 square miles; while the water-spread below 12 fathoms of depth was made up of five portions, having a total area of 5010 square miles; the largest of these five portions being the band lying immediately under the cliffs of the Ust-Urt plateau, and having an area of 2152 square miles. It is to be noted, however, that the water-spread of Lake Aral on the chart of 1848 does not include the area of the Abougir Gulf, for which 700 square miles must be added; and this will make the area of Aral in that year to be 25,236 square miles.

Lake Aral occupies the deepest part of that depression in the north-west of Asia, which Humboldt has described as being due to a rupture and subsequent sinking down of the crust of the globe. It is the recipient of the waters of the Amú-darya and of the Syr-darya, whose united volumes afford to it an average supply of about 2000 yards per second throughout the year.

Its waters, though sensibly salt to the taste, are under necessity potable by the wild animals (antelope) and domestic cattle which are found upon the larger islands, and the degree of saltness seems to be considerably modified by winds, which drive before them the streams delivered to the Lake by the mouths of the Amú and of the Syr.

The deepest part of Lake Aral is found in the western band lying immediately under the cliffs of Ust-Urt, and in this the maximum depth is 222 feet, while the minimum is 84 feet. From the western to the eastern shore the depth diminishes, but not very regularly, until the water-spread is lost in shallow bays and rush-covered lagoons, from which the waters retire during the prevalence of east winds.

The perpendicular cliffs bounding the western coast of Lake Aral have on their summits the Ust-Urt plateau; their line continues with diminished height to the north, and terminates in that direction; but they reappear in lat. 47° 15′, at about 20 miles to the south of the Mougojar Hills in a steep escarpment, which continues with increasing height in a south-westerly direction to the Caspian Sea. This escarpment, which is locally called the Tchink, is also the continuation of the cliffs in a south-westerly direction from the south-west corner of Lake Aral, and it thus forms the northern and southern boundaries of the Ust-Urt plateau. The line of the Tchink is not a regular one, but juts out into bold promontories over the lower ground, and is broken by deep ravines which enter the central mass of the plateau, and probably communicate with numerous deep bowl-shaped depressions occurring upon its surface. Upon the Ust-Urt, between lats. 45° and 46°, the map shows a chain of salt-lakes running across it, besides several extensive tracts of sand; and at about lat. 43° 20′ a cleft or depression on the edge of the Tchink seems to have admitted an overflow from Lake Aral at a higher level, into a large low-lying tract of ground, which is now occupied by the salt-tract and sands of Barsakilmas, under lat. 44°. On the south, the Tchink is continued into the high ground which encircles the eastern shore of the Karaboogas Gulf of the Caspian, and which joins on to the mountains lying to the north of Krasnovodsk and the great Balkan. On the west, Ust-Urt is bounded by the Karasu inlet of the Caspian, the low peninsula of Buzachi, and by that of Mangishlak, with its parallel ridges of Aktao. Immediately to the south of this, again, lies a depressed crescent-shaped tract, having its concavity to the west, and bounded on that side by a small plateau similar to Ust-Urt; while to the west and south of this smaller pateau are the Caspian and Karaboogas Gulf respectively. The

whole of the low-lying sandy portions near the Caspian must have been covered at a former historical epoch by the waters of that sea when it had a higher level than that of to-day.

The country round the northern edge of the Ust-Urt plateau is covered with salt-tracts, quagmires, and stretches of sand, which continue to characterise the region lying immediately to the north of Lake Aral. Colonel Veniukoff states, that a comparison of Gladychef's map of Aral, made more than 100 years ago, with that of Admiral Boutakoff, shows that the country near the Tchebass Gulf must have been under water in the last century. The Irgeez and Tourgai rivers, and the various other streams descending into this depressed region, are lost in salt-lakes and quagmires, of which a considerable number are dotted along the surface of the steppe in a northerly direction into the drainage valleys of the Ubagan and of the Tobol, which flow into the Obi. The south-east shores of the Lake resemble those on the east, and the country on the south has been sufficiently described in the Notes on the Amú-darya.

The sand-dunes and tracts of hard clay occurring on the low shores of Lake Aral point to the conclusion, that extensive areas of country which are now dry land were formerly covered by the water-spread of the Lake. It has been remarked that the mouth of the Syr-darya has become, in recent years, fordable; and that the depth of water between the island of Tokmak Atta and the south shore of Lake Aral has diminished. It is also an established fact that a minaret, which grey-beards of the Kirghiz state was formerly situated on the edge of the eastern shore, is now at some hours' walk distant from it; and finally, since 1848, when it was a marshy swamp, Gulf Abougir, at the south-west corner of the lake, has been entirely dried up, and its bed is now under cultivation. There is no doubt that the cause of this continuous shrinking in the area of Lake Aral is, that the evaporation from its surface is in excess of the supply received by it from the Amú and from the Syr; and an attempt will now be made to approximate to the rate of evaporation which takes place in the basin of Aral, from such measurements as are available for the purpose.

Since in 1848 the area of the water-spread of Aral was 25,236 square miles, and the area of its water-spread at a depth of 24 feet is 18,304 square miles, it follows that the water-spread diminishes by about 866 square miles for the loss of each yard of depth down to 24 feet. The only rough observation of the actual decrease of depth in Lake Aral that I can find, is one made by Boutakoff, who noted that at the entrance of the Abougir Gulf the depth of water had decreased 18 inches

between the years 1848 and 1858, and in this period, therefore, the lake lost 0·05 yards per annum in depth, and had in 1858 an area of 24,803 square miles. During the ten years in question there is no reason for supposing that any extraordinary cause affected the quantities of water discharged into the Lake by the Amú and by the Syr; and I shall therefore assume that the receipt of the lake was constant. A question arises, however, as to what this receipt might actually have been; for the closing of the Loudon Canal on the lower course of the Amú in 1857 has, subsequently to that date, caused all that water to be poured into Lake Aral which formerly flowed to irrigate the lands of Atta Murad Khan, and to aliment the Lake Sarakamish on the Uzboy course of the old Oxus. This quantity of water can only be roughly estimated from the dimensions which Loudon is stated to have possessed, and from the flooding of the lower courses of the Amú-darya which has taken place since 1857, and from these I am inclined to think that Loudon must have carried not less than 1500 cubic yards per second during a high flood of the Amú, or say 450 cubic yards per second during the whole year. From the 2000 cubic yards per second, therefore, which I have stated as being received by Aral at the present day, this quantity must be deducted, leaving 1550 cubic yards per second for the receipt of the lake between 1848 and 1858. The water-spread of Lake Aral would also be influenced by the rainfall it received, and by the quantity of earthy matters carried into its basin by the waters of the alimenting rivers. Since the earthy matter would be but $\frac{1}{2000}$th, roughly, of the water received by the Lake, into which but little is carried during high floods, since the marshes act as settling grounds; this cause of variation of level may safely be neglected in a calculation having for its object the rate of annual evaporation. No data exist from which the annual receipt of the lake from rainfall can be stated with certainty, but we may, however, with M. Elisée Reclus, assume it to be 23 centimètres, or 0·25 yards per annum, which is a mean of the amount of registered rainfall at the two nearest stations, Ashtrakhan and Uralsk. The rate of evaporation yearly from the surface of Lake Aral will then follow from the following equation:—

Volume evaporated = volume received, plus volume actually lost, plus rainfall received. And for the period 1848 and 1858 the rate of evaporation will be found to amount to 0·906 yards per annum, say one yard per annum, allowing something for earthy deposit in the basin of Aral.

It is a curious coincidence, that, taking the barometric observations of the height of Lake Aral made in 1826 by Anjou and Duhamel, and by Struve in 1858, the rate of evaporation

obtained for the basin is almost precisely the same as that found from Boutakoff's soundings. In 1826 the level was found to be 36·2 feet above mean sea-level, and in 1858, 24·9 feet; giving a fall of 11·3 feet, or 3·76 yards, in the thirty-two years. The area of Aral in 1826 would therefore have been 26,405 square miles; and by using the same equation as before, the rate of evaporation will be found to be 0·95 yards per annum. We may hence assume, that the rate of evaporation of one yard per annum which has been found, approximates sufficiently to the true rate, to allow of some speculations being hazarded regarding the physical aspects Lake Aral may have presented under different conditions of supply from the rivers feeding it.

Taking first the case that Lake Aral received no supply whatever—a circumstance which may have occurred if both the Amú and the Syr flowed to an outlet in the Caspian Sea—we shall find that down to 72 feet in depth below the present level, twenty-four years only would be required to dry up Lake Aral into the five separate portions which have already been mentioned, and of which the largest and deepest has an area of 2152 square miles, and contains 62,380,000,000 cubic yards of water. If the non-receipt of water continued, less than fifty years would elapse for the *entire* desiccation of this deepest remaining part, and a very much less time, of course, for that of the other four shallower portions; and Lake Aral would consequently disappear in less than three-quarters of a century from the present date, if the waters of the Amú and of the Syr were otherwise disposed of than at present.

At the level of 1848 Lake Aral contained 1,233,434,000,000 cubic yards of water—a quantity which is equal to a supply of 2000 cubic yards per second (the present contribution of the Amú and of the Syr), taking place during 19½ years; but since evaporation would be going on from the moment it is supposed such a supply to the dry basin of the Lake recommences, it is manifest that to bring the water-spread again to its present area would require more time than that number of years.

The time required for this operation can be found from the following equation:—

Content of lake equals supply during the time from Syr and Amú, plus supply from rainfall, minus evaporation during the time; and with the supply of 2000 cubic yards per second and a rainfall of 0·25 yards per annum, and an evaporation of one yard, it will be found 40¾ years only would be required to restore Lake Aral to the size it had in 1848. Less than a century and a quarter only would consequently be required to dry up the Lake *entirely* and bring it again to the level it

possessed in 1848, if it subsequently received, again, a supply equal to that of to-day.

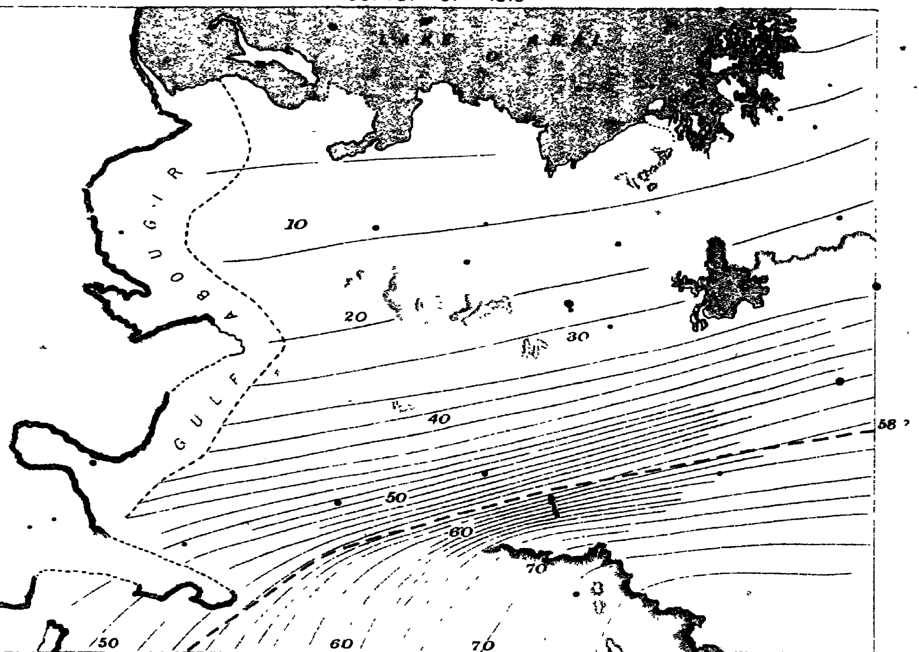
At the present time about one-half of the flood-discharge of the Amú-darya is absorbed in the irrigation of Khiva, and probably the same, if not a greater proportion, of that of the Syr-darya is diverted for the cultivation of the Khanate of Kokand. From these two rivers alone, therefore, Lake Aral might, at some particular epoch, have received double the supply which it receives to-day; to say nothing regarding the probability, that the Rivers Tchuy, Sary-Su, Talass, Irgeez, Turgai, &c., which now end in the sand, and that many other rivers, such as the Kinderlik, Demus, Baskatis, Jastus, &c., which have disappeared altogether, in the regions round Lake Aral, formerly contributed their waters to aliment its water-spread. Under such circumstances the lacustrine basin of Aral would have continually filled up, until either the surface assumed such dimensions that the evaporation from it equalled the supply, and so arrested its further increase; or until it reached some point, over which the waters could escape and flow away over the adjacent country on a lower level.

Now, since the Caspian level of 1875 was ascertained to be 243 feet below that of Aral, the description which has been given of the country shows, that the waters of Lake Aral could have escaped at some particular point, and so have limited the water-spread to a determinate area, beyond which it could not have increased.

The accompanying diagram (No. 22) portrays, in a sufficiently approximate degree, the ground which is situated at the south-west corner of the lake; and the mere inspection of it will show that when Aral attained to a level of about 51 feet higher than that of to-day, its waters would have flowed over a spur (which runs out from Ust-Urt in a south-easterly direction) and into the Uzboy Channel, by which the Kunya-daryalik arm of the Oxus formerly flowed down to the Caspian Sea. A reference also to the Notes on the Amú-darya, where a description is given of the watermarks seen upon the sides of the Kashkanatao Hills, will afford confirmation, if any is needed, of this additional depth which Lake Aral certainly possessed at a former and recent epoch.

With this additional depth of 17 yards the water-spread of the Lake would have had an area of 39,258 square miles at a height of about 208 feet above mean sea-level, and the evaporation taking place from this surface, would have absorbed a supply of about 3850 cubic yards per second. Assuming the Lake to have received the same rainfall as that which has been supposed in the previous cases discussed, the united volumes contributed by the Amú and by the Syr, for the permanence of such a high-

Diagram No 22



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level Aral, would require to be about 3000 cubic yards per second, or half as much again as the quantity those rivers bring down into the Lake at the present time.

Besides the point where the overflow of Lake Aral could take place at the south-west corner, and in all probability did take place up to a very recent period, since Russian information of the sixteenth century states that from the Blue Sea (Aral) the River Arzass flowed to the Sea Khvalim (Caspian);* a depression in the edge of the Tchink, in lat. 43° 20', has been indicated, by which the waters of the Lake flowed to flood the salt-tract and sands of Barsakilmas. The height of this cleft is stated upon the Austrian Staff-map of Central Asia to be 244 feet, though future observation may make it lower. From Barsakilmas, again, they would very probably have flowed to fill other depressions, situated at lower levels, on their progress westwards to the depressed basin of the Caspian, and the surface of Ust-Urt would have been so covered by a series of lagoons and connecting channels, and have presented the appearance of a sea full of islands.

As far as present information shows, there would not appear to exist any other depressed points in the high cliffs forming the western limit of Lake Aral by which a similar overflow could have taken place; but it is not improbable that such may yet be found. Humboldt imagined that these cliffs above lat. 42° would have prevented any communication between the waters of the Aral and of the Caspian; since he supposed the line of their declivity to join on to the Mougojar chain of hills on the north. More accurate observation shows, however, that this is an error, and that the line of the Tchink which forms the northern limit of the Ust-Urt plateau commences under lat. 47¼°, about 20 miles south of the Mougojars. The 'Catalogue of Trigonometrical and Astronomical Points in the Russian Empire,' compiled by the Geodesical Department of the Military Staff, states the ground about the head of the Tchagan stream, in lat. 47° 7' 27" and long. 58° 17' 41" [Green], to be 257 above mean sea-level. The difference between this and the height of 210 feet, at which Lake Aral overflowed at its south-west corner, is sufficiently small to suggest a probability that more accurate levelling will correct the barometrical height given for the ground over which an overflow from the north-west corner of Aral would require to have taken place, to cause the physical aspects which characterise the country stretching from there to the Caspian Sea. It is also to be noted, that the Ust-Urt spur, at the south-west corner of Lake Aral, would have in all proba-

* Since writing this, I am inclined to think that by Arzass was meant the branch of the Syr from below Otrar, along the Janidarya and Uzboy to the Caspian.

bility had its surface somewhat worn away by the action of overflowing water, driven forcibly over it by the northerly gales which distinguish Lake Aral; and this circumstance would account for some feet of the existing difference between 257 and 210 feet, which requires reconciliation.* If this should eventually be effected, Lake Aral would have overflowed both at the north-west and the south-west corners, as well as by the depression described as existing in the Tchink; and the aspect presented by the country subjected to this inundation would be similar to that possessed at the present day by the central regions of the lower Amú, which have already been described in detail in the Notes on that river. Escaping from the higher basin, with no momentum, over the smooth compact clay country, the waters would have spread laterally, and have alimented those rush-covered marshes which were spoken of by the Chinese when they advanced to the Caspian as conquerors under Pantchao, at the end of the first century of our era, and in which the nomad Kirghiz at the present day find shelter during the winter, though the ground they cover is almost entirely dried up. Here and there, at intervals, the waters would have formerly filled up depressions and swept sand into them, which at the present day remains on the tracts characterising these regions. It seems not impossible, besides, that they might have penetrated and flooded portions of the Ust-Urt plateau by the deep ravines which break the line of the Tchink escarpment, and have so entered into the central mass intervening between the Aral and the Caspian Seas.

A remarkable confirmation of the state of things which has been supposed to have existed, is afforded by the circumstance that not until the commencement of the fourteenth century does any European map of these regions hint at the separation of the basins of the Caspian and of the Aral. On the other hand, the Arabs who conquered Khwaresm were acquainted with the fact that Lake Aral had a distinct basin, and this knowledge, however much in contradiction it may appear to be with the ignorance which existed among Europeans on the subject, is, on consideration, entirely susceptible of a reasonable explanation; for these must have been prevented by the actual physical aspects from examining into the swamp-laden intervening tract, and from so becoming acquainted with the isolation of the upper reservoir, which was evident to those living along its shores. Still more if it is considered that the junction was formed by an intermittent overflow, which depended upon the quantity of water used for irrigation and upon the varying volumes of the alimenting rivers during floods, it is evident

* The required point I have since found at Kazar Chakan, lat. 46° 25′ 4″, long. 58° 34′ 33″, whose height is 210 feet.

that the Arabs must have had precisely the sort of information regarding the water-spread of Lake Aral, which was unattainable by the Europeans of the Caspian; and the mystery with which this ignorance has hitherto invested the state of this Sea since the earliest times is in this manner explained.

It has been stated that one European map hints at the isolation of Lake Aral, and it is remarkable that the confused information which has hitherto been attributed to this, affords in itself some confirmation of those appearances which the Aralo-Caspian region would present when subjected to the intermittent overflow which has been described. The late Sir Roderick Murchison, in his address to the Royal Geographical Society for 1867, in quoting from some notes drawn up by Colonel Yule upon the mediæval maps of these localities, stated that the map of the Venetian Marino Sanudo (which was submitted in the year 1325 to the Pope and to the King of France, with a project for the destruction of the Muhammedan power) bears strong testimony to the existence of Lake Aral. It clearly shows *Mare Yrcanum, Caspis,* or *de Sara,* in the proper position of the Caspian, which is connected by a river with another sea further to the east, and full of islands. This sea Colonel Yule thought to be, in a startling degree, suggestive of Aral; and further to the east of it, towards Sara, appears a third and smaller sea, without a name, into which Gyon (*i. e.* Jihoon or Oxus) flows. The map is engraved in Bongarsius' 'Gesta Dei per Francos,' vol. ii., and there is a *quasi facsimile* of it in the second volume of Vincent; but in this the third sea is scarcely to be recognised. Such a map as this would not very untruthfully represent the Aralo-Caspian country, at a date not long after the cessation of an overflow of the kind which has been suggested. The sea full of islands would be the surface of Ust-Urt, studded over with lagoons and lakes in a half dried-up state; while the more pronounced cliffs of the plateau would distinctly isolate the third sea into which the Jihoon flowed, and which would occupy the position relatively of Lake Aral itself.

On three sides the isolated basin of Aral is now divested of very much of the difficulty which formerly attached to speculations on its probable past aspects; but on the north, *i.e.* on the fourth side, there is still an obscurity, which can only be cleared up by future accurate levelling. In this direction there exists a transverse ridge which divides the drainage flowing southwards by the Tourgai and its affluents towards Lake Aral, and northwards by the Ubagan and the Tobol into the River Obi, and so on to the Frozen Ocean. If the height of this ridge be about 210 feet above mean sea-level, it is evident that the waters of a high-level Aral might have escaped in this direction also, and

that the Lake, along the water-course lines which have been mentioned, would have formed a junction with the Frozen Ocean.

In 'Asie Centrale' Humboldt expresses himself very decidedly regarding the low elevation possessed by this dividing ridge, and speaks of the ground it crosses as the great depression by which the waters of Lake Aral formerly communicated with the Frozen Ocean. He states the height of Oorsk to be 52 toises, and that of the town of Tobolsk to be 18 toises; but as the correct figure for the bank of the Ural River at Oorsk is really 590 feet, that for Tobolsk is probably some few feet less than 200, and the height of the dividing ridge at the sources of the Ubagan might thus be about 210 feet, allowing a small slope for the water-course-line down to the last town named. This rough approximation to the height of the ridge agrees pretty well with that at which Aral is shown to have overflowed both at the north-west and south-west corners, and affords some presumption that the ground about here has undergone no change in historic times.

On the other hand, the height of the church at Oorsk is about 690 feet, and the country east of that place is thus described in 'The Kirghiz Steppe of Orenburg,' by Lieutenant-Colonel of the Staff, L. Meyer:—"From Oorsk there stretches, in an easterly direction, a flat elevation, with very gentle declivities, noticeable on the map only from the direction of the streams, but in nature seeming quite flat. This elevation, the absolute height of which is about 1100 English feet, abounds in lakes along its slopes, and serves as a water-shed for the rivers running north and south, but in no way deserves the name of mountains; on the contrary, it belongs to one of the level places of the steppes, and therefore has no special name."

On this I would remark, that if the ground east of Oorsk continued in that direction, with the very small decrease of height which the above passage indicates, the southern slope of the dividing ridge towards the low ground north of Lake Aral would be a very steep one; which is not actually the case. But besides this, the height of 1100 feet, assigned by Colonel Meyer to this ground, is probably somewhat exaggerated. He describes the country as if it was either level or fell away gently from Oorsk eastwards, though it actually rises along a distance of 90 miles in this direction by a gentle slope; and if we give this, 3 feet per mile, the height of the ground at the point where it actually commences to fall to the east again (*i.e.* in lat. 51¼°, long. 58⅓°) would be 900 feet at the most. From here the country continually falls to the east, along a distance of 180 miles, to the sources of the Tourgai flowing south, and of the Ubagan flowing north; and if Lake Aral ever did flow over the ridge, the point where the waters passed should be 210 feet, about,

above mean sea-level. The fall, therefore, along the 180 miles would be 900 – 210 = 690 feet, or less than 4 feet per mile; a slope which is gentle enough to be in agreement with the general idea of the flatness of the country as described by Colonel Meyer: but even if the maximum height was 1100, instead of 900 feet, the slope to the east along the 180 miles would not be 5 feet per mile, and there is nothing, therefore, *primâ facie*, against the probability of the overflow having taken place, as far as the actual physical features of ground have been described.

That this overflow of Lake Aral actually did take place over the dividing ridge on the north in very recent times, there is a mass of indirect evidence to show. Baron de Herberstein, who was sent twice during the sixteenth century from the Court of Vienna on diplomatic missions into Russia, wrote an account of the country, entitled 'Rerum Moscovitar. Commentarii, Russiæ breviss. Descriptio. 1549. In fo.' The map attached to this, M. Vivien St. Martin describes as the first attempt at a graphic representation of the Muscovite Empire in its modern aspect, and shows the River Obi running from the Lake of Kitay into the Frozen Ocean. In Bergeron's work, 'Voyages faits principalement en Asie dans le 12e, 13e, 14e, 15e siècles, &c., La Haye, 1735," there is a curious letter, which is stated to be written by Jean Balasch, of Arnsberg, to Gerard Mercator in Cleves, under date 1581. The writer, knowing that the geographer was interested in the route to Cathay, sends his letter by the hand of a Flemish traveller, a soldier by profession, who, having been some years a prisoner in Russia, had been sent to Antwerp to engage artisans for the purpose of constructing vessels for the navigation of the Dwina. This Flemish soldier is stated to have related, that when in northern Russia he travelled to the River Obi, partly by land and by the country of the Samoiedes and Siberians, and partly by the River Petchora. That he equipped a ship full of merchandise, whose draft was small, and took with him everything necessary for the voyage, besides several men of the country who could speak the language, and who knew the River Obi, where they went every year. That he started by the way of Ugoria, Petchora, &c., in surveying and examining the route: . . . That when he arrived at the Obi, which was said by the Samoiedes to have seventy mouths . . . he determined to examine three or four only of them, so as not to lose time . . . That from there one can ascend the Obi . . . to a place which he himself had reached by land from the country of Siberia, and which was only twelve days' journey from the mouth of the river . . . . and is called Jaka Olgush, from the name of a second river which joins the Obi.

That when one has arrived there the greatest difficulties are past, for the people of the country say, that after three days of navigation (which is a sufficiently rare thing for them to perform, since several who had only proceeded one day's distance had there perished with their leather boats in a tempest), one finds on the water-spread of this great River Obi many vessels laden with precious merchandise, and manned by black people, coming by a great river called Ardok, which enters the Lake of Kitay.

Jenkinson, travelling through Khiva in 1559, states in his narrative, which will be found in Hakluyt, that "the great river Oxus falleth into another great river called Ardok, which runneth toward the north, and consumeth himself in the ground, passing underground above 500 miles, and there issueth out again and falleth into the Lake of Kitay." The Swedish ambassador Olearius also states, and gives a map which shows, the Obi to flow from the Kitay Lake, in 1636. The passages which have been given from Bergeron and Jenkinson, as well as the maps from Herberstein and from Olearius, all go to show that in the sixteenth century Lake Aral overflowed the transverse ridge on the north, which divides its basin from the drainage passing into the Obi. In the fifteenth century the Cardinal d'Ailly (Petrus Alliacus) thought there were two Caspian Seas,—one isolated and surrounded by land on all sides, and the other communicating with the Northern Ocean, a belief which is strongly presumptive of the present Caspian and of the overflow of Lake Aral to the north.* Passing over the Arabian geographers, in whose writings it certainly might be expected that some mention of the overflow would have been made, if it had been in operation at their day (a circumstance which, however, should not be taken for granted, since it was an intermittent overflow dependent upon the supply of the rivers feeding Aral), we find that every geographer and writer up to the fifth century B.C., with the exception of Ptolemy, Diodorus the Sicilian, Aristotle, and Herodotus, affirms the junction of Aral with the Frozen Ocean. Notwithstanding Ptolemy's great authority in such matters, we find Quintus Curtius and Agathemerus, who came immediately after him, contradicting his assertion regarding the isolation of the Caspian. Nor were the Greeks satisfied with the information given by Herodotus, since Alexander fitted out an expedition, whose researches on the Caspian expressly contradicted that state of isolation which the Father of History assigned to it, in such terms as suggest the idea of still more

* It may possibly be that the basin of Chelkar-tengis might overflow to the north while remaining distinct from Aral.

ancient discussion of the same question having taken place, regarding perhaps the expedition of the Argonauts.

Among the descriptions of the Aralo-Caspian Sea which have been handed down to us, those of Strabo, Pomponius Mela, and Pliny are especially remarkable, both from the similarity of the aspects described and the light which the information afforded by one writer sheds upon what is obscure in another. The nearness of the date at which these three authors wrote offers a strong presumption against plagiarism, and is good evidence that in their day Lake Aral overflowed to the south, to the west, and to the north; though they supposed that the ocean made an irruption into the land in a southerly direction. Nor are the contrary assertions made by the four exceptional classical authorities, nor is even the silence of the Arab geographers, regarding this overflow of Aral, any evidence against the occurrence of the fact for which there is such strong evidence at other epochs. The figures which I have submitted in previous parts of this paper (making allowances for all possible incorrectness which may result from deficient knowledge) afford very strong grounds for asserting that the level of Lake Aral might have fluctuated in a degree enormously greater, during short spaces of time, than that which has hitherto been generally supposed, and much of the obscurity which has attached to the aspect of the Aralo-Caspian Sea in past historical times, is cleared up by the very simple explanation submitted for consideration in these Notes.

NOTE.

TABLE OF DIMENSIONS OF LAKE ARAL.

	Square Miles.
Area of water-spread of 1848	25,236
Area of water-spread of 1858	24,803
Area of water-spread at 24 feet depth below level of 1848	18,304
Area of water-spread at 48 feet depth below level of 1848	13,297
Collective area of five portions at 72 feet depth below level of 1848	5,010
	Cubic Yards.
Content of lake from level of 1848 down to 24 feet in depth	530,805,000,000
Content of lake between depths of 24 and 48 feet ..	391,537,000,000
Content of lake between depths of 48 and 72 feet ..	226,905,000,000
Content below 72 feet of depth	84,188,000,000
Content of Aral in 1848 .. .. .. Cub. yds.	1,233,435,000,000

The three or four hundred millions of cubic yards, which Abougir probably contained in 1848, are not included in the above figures.

XVI.—*Journey from the Pangani, viâ Usambara, to Mombasa.* By the Rev. CHARLES NEW.*

[*Read*, April 12th, 1875.]

SINCE my return to Eastern Africa I have accomplished a journey from the River Pangani through Usambara onwards, by way of the Wasegeju and Wadigo, to Mombasa, and I have a few notes thereon which I think it may be worth while to communicate.

Vuga has been visited before by Krapf, Erhardt, and, more lately, by Allington; and Burton and Speke made their way in company to the outskirts of the Usambara country. Most of these gentlemen having written something upon the subject, I may not have anything very new to say; but I think it may, nevertheless, be worth while to remind you, particularly at this time, that there is such a country in existence. If East Africa is to become a free country, every foot of land, especially near the coast, will acquire a value hitherto unknown, but Usambara possesses many characteristics which will make it particularly important.

I reached Zanzibar on the 2nd of June, 1874. In another fortnight I had organised a small party and was *en route* for the mouth of the Pangani, or Ruvu, as the river is called on the mainland. I may say, in passing, that among my men were some notables, such as Mabruki Speke, &c., and most of them served on the expedition which brought to the coast the remains of the late Dr. Livingstone. My cook, Farijala by name, it is said by the men here, took a leading part in the preservation of the great traveller's body.

Arrived at the Pangani, my plan was to ascend the river as far as Chogwe or Tongwe, to climb the mountains on their southern or south-western side, to visit Vuga, and then to take a north-easterly course towards Mombasa. To this plan Sayed Salehe, Governor of Pangani, most resolutely objected, suggesting that it would be safer and better for me to go by way of Tanga and Bondei. He knew—and, fortunately for me, I knew—that the acceptance of his advice would most effectually prevent my reaching Vuga. The situation was this:—Vuga is now in the possession of Kimweri, who has been placed there as king by his father, Samboja. This was done, however, to the exclusion of Sikuluaru, the late chief's son, who was placed in the hands of his uncle or half-uncle, Kanyagera, with a view to his being made king. Kanyagera was attacked by Samboja, and driven to Bondei (or the Valley) in the East, where he is now posted.

* Vide map, 'Journal of the Royal Geographical Society,' vol. xxviii. p. 189.

He has secured the alliance of the Sultan of Zanzibar, whose Askari on the coast are acting in concert with Kanyagera to restore Sikuluaru's son to Vuga. The chief of the Sultan's agents is one of his own slaves, called Muariko—Captain Muariko—who has rather a strong body of men under his command at Jamri, on the Pangani, in the district of Tongwe. But Muariko was under the immediate authority of the Governor of Pangani. The former is a tall, fine-looking man, but very black, and he has a dreadfully cut-throat expression in his dark visage—at least, I thought so, and it is likely I am right, considering the work in which he has for many years been engaged. He is helping Kanyagera's project by a large amount of cunning, rascality, robbery, slave-selling, and murder—the heads of as many as a score of Samboja's "brothers" having already fallen off before the keen edge of his knife. He is bent upon exterminating the race. Petty fighting is constantly taking place between the allies and their foes, the worst feature of which is, that a great many captures are often made on both sides, and each enriches itself by the sale into slavery of its victims.

Such being the state of things, I could easily understand why Sayed Salehe should object to my going to Vuga, and why he should wish to place me in Kanyagera's hands. He knew that the latter would not like me to make friends with Samboja; at the same time I should not be able to tell the Sultan that Salehe had prevented my going to Vuga.

I held to my own scheme, and carried my point. We made Chogwe by boat; and thence proceeded to Tongwe on foot.

The Pangani is a large body of water. The banks are low, but, judging from the abundant vegetation, very fertile. The Arabs and Wasuahili are cultivating them on both sides, and, of course, by slave-labour. Upon these productive districts I fear the Arabs, finding they cannot get slaves at Zanzibar, Pemba, &c., will come and establish themselves. Here there is nothing to prevent them getting any number of slaves; so that the effect of the late treaty with the Sultan of Zanzibar will be just to remove slavery from one place to another, from the islands to the mainland. I cannot help thinking that if slavery itself be not rooted out, the above result, with very disastrous consequences, will take place very largely.

The Pangani cannot be ascended above Tongwe on account of falls, which are reported as being very fine, and the roar of whose waters at the distance of a couple of miles, I can testify sounds like low thunder upon the ear.

Two marches from Tongwe brought us to the south-western foot of the Usambara Hills; the Ruvu, as I must now call the river, being very near on the left. Beyond this the river splits

up into many parts, forming a kind of irregular chain-work, a number of small islands being the result. Upon these islands the Wasegua have built their villages, thus securing themselves against the attacks of the Masai, who, bold as they are, hesitate to pursue their prey across deep water; and numerous as the divisions in the river are about here, they, nevertheless, form deep moats, or rush by in broad, strong, and really dangerous torrents, sometimes surrounding the villages two and three-fold.

The Wasegua are a numerous, interesting, and well-to-do people, following both pastoral and agricultural pursuits. The semi-civilization of the coast has had much more influence upon them than upon the Wanika for instance, and their original garb and arms have been thrown aside for the dress and musket of the Wasuahili. The presence, too, of an abundant supply of water seems to have suggested to them the propriety of washing themselves and clothes, so that, for East Africa, they are a clean people. But we must not be hard upon the less clean, for it frequently happens that in such cases there is a scarcity of water, and the people therefore use oil as a substitute.

The Wasegua occupy the district lying between the coast people and the Ruvu on the one hand, and the Wasagara and Wanugú on the other.

On our sixth stage (they were short ones) from Tongwe, we reached Makuyuni (Among the Sycamores). Here we halted, in order to send messengers to Samboja and Kimweri, and to inform them of our desire to visit them.

On the third day after we heard from Samboja, to the effect that he would meet us at Mombo, a village about midway between Vuga and his own residence, for maneno (palaver).

Complying with this arrangement, we proceeded to Mombo, and found Samboja seated outside a poorly-stockaded village, beneath a large tamarind-tree, and surrounded by about 300 of the wildest-looking fellows I ever saw; every man armed with a flint musket, and most with a sword of some sort.

I was surprised to find Samboja in appearance and dress an Arab: with white kanzu, black surtout braided over the shoulders with tinsel, coloured girdle and turban, sword and dagger mounted in silver, an oblong case of silver like a large snuff-box, and stuffed with charms, at his breast, he presented a great contrast to his poorly-clad brigand-like followers. I expected to have met a tall, fine, black, shaggy, fierce, lion-like sort of man; yet here was a short, stooping, yellow, haggard, tame-looking fellow, not at all imposing or impressive at first sight. But I soon found that, with a high, nervous temperament, he was sharp, short, active, energetic, and résolute. I told him my errand, whereupon he said in substance:—"Very well. But

you can't go to Vuga; you can't see Kimweri, my son; you *may* follow me to Masinde. Give me any present you have for the King, and I will then see you safe out of the country." This was said with a cool decision which I could not mistake. I saw he was afraid that, having come to him through one portion of his foes, I might have some secret understanding with them. I yielded to him for the time, and went to Masinde, situate upon the north-west slopes of the mountains. The end of this was that I was enabled to disabuse Samboja of all suspicion, and he consented to do my utmost wish.

The way to Vuga from Masinde was in a backward course S.E., and the march between the two places turned out to be a very hard day's work. Midway between the places we faced the mountain's side and began the ascent. It was extremely stiff climbing, and for the men with their loads it was cruel work. Up, up, up, then down and up, for three hours, we at length approached Vuga; but, instead of being led into the town, were taken round to a small kraal on the other side of it, and told that *that* was to be our place of abode.

Vuga is built upon the very top of a rounded peak, some 4700 feet, by aneroid barometer, above the level of the sea. It comprises between two and three hundred small cone-shaped huts, plastered with mud within and thatched without, but room for them all is only found by hewing out ledges from the sides of the peak. The town is entirely without defences, except those of a natural kind. Valleys drop to great depths on all sides of it, and it can only be reached by the steepest acclivities. The prospect it commands is very fine. There are mountain peaks, the loftiest of which cannot be less than 7000 feet above the sea-level: these present every variety of shape; there are ridges upon ridges, rising one above another till lost in the clouds; there are rocks and crags and "threatening steeps" *ad infinitum;* there are enormous valleys, gloomy ravines, and glens as romantic as Glencoe; there are dark majestic forests, compact woods, wildernesses of brown jungle, expanses of tall, waving grass, beautiful slopes of short, green turf, and everywhere patches of cultivated land fresh and verdant as an Eden; brooks, and streams, and torrents trickle and murmur, tumble and splash and roar on all sides. The dawns are often gloomy, but are sometimes very fine, particularly from the elevated spots when the clouds and mists are below you, lit up by the sun, and rolled by the wind into all manner of fantastic shapes; the sunsets are often gorgeous, and the play of colour, light, and shade upon clouds, mountains, and valleys, such as no pen could describe or brush depict. Such is the kind of scenery which passes before the eye, as in a grand panorama, during the

course of a single day's ramble among the mountains of Usambara. Justice has not been done to this south-eastern Abyssinia, and I cannot hope to do more than just call attention to some of its leading features and really remarkable beauty.

Among the picturesque beauties of the neighbourhood of Usambara perhaps I ought to mention the presence of a lake at a short day's march north-west of Masinde. From the accounts of the natives it is about nine miles in length and one-third, or less than one-third of that in breadth. I saw it both from Masinde and from the heights of Vuga. I had never heard of this lake before. It is called Mangu. It derives its waters from the north-western portion of Usambara Mountains, and sends off its surplus by the Mkomazi into the Ruvu.

The soil in the neighbourhood of Vuga, and indeed almost everywhere, is a deep red; and the rocks—cropping out of the mountain sides, crowning the highest peaks, and lying in the beds of most torrents—are granitic and quartzose. But the stream, taking its course round the north side of Vuga, flows over beds of sandstone. Coal is said to have been sent from Usambara to Zanzibar, but, though I tried hard, I did not succeed in obtaining a specimen. The natives brought me charcoal, bearing evidence, however, of its having been dug from beneath the surface. They insisted, however, that *bonâ fide* steam-ship coal, as they called it, from the assurances of the Wasuahili, did exist in their country. The soil is evidently very fertile, and from the constant accumulation of clouds and frequent rains never suffers from drought. Almost anything might be raised here. A basket of fine ginger was sent me by the king: it grows wild, and the natives cultivate it for their own use. At present plantains and Indian corn are the staple articles cultivated and consumed by the Wasambara. The coco-nut palm they will not cultivate, on account of a superstitious belief that wherever that useful tree is planted their enemies will prevail.

The climate during my stay at Vuga, with the exception now and then of a few hours at midday, was delightfully cool, the temperature being below the malaria-generating point; so that I should say the country presents all the advantages of a sanatorium to the future civilisers of East Africa. Sometimes we had the bright, clear, cool, early spring weather of home; but sometimes it was more like our September.

The population of Usambara is not large, and appears to be becoming less and less. The country is in a far less flourishing state in this respect than it was at the time of Dr. Krapf's visit. This is owing to the intestine feuds which have rent the people into factions ever since the death of Kimweri the Great.

Almost every son of the old man—and he had many—seems to have thought his claim to succeed his father equally good; each managed to secure some friends and supporters, so, throwing themselves headlong at each other, they have dashed themselves to pieces. Evidences of more flourishing days, larger population and considerable possessions in herds and flocks, meet you everywhere—in vacant villages, in wildernesses that once were plantations, and in broad, well-made paths, judiciously carried round instead of over the mountains, now wholly neglected and altogether impassable. The people of former days, as compared with those of the present time, were not only more numerous and well-to-do, but they were much more clever, enterprising, and energetic. War has had not a little to do in producing this result. But, to go further, the supposed advantages of war have been its perpetuation. No doubt love of victory and love of power are element sin this case; but love of money—greed of gain—has not been a minor consideration. Well, in almost every battle some will be taken prisoners, and the existence of *slavery* upon the coast makes these a valuable acquisition. They can be sold—turned into ready money—whatever the people care for most; so that *slavery* has not a little to do, even from this standpoint, with the continuance of these quarrels which have so long torn Africa to pieces.

The present people of Usambara may be said to comprise three distinct tribes or races. The Wakilinde, who are the ruling section; the Wambugu, who look more like naturalised subjects from other parts; and the Wasambara themselves, who are the aborigines. The Wakilinde appear to me to be of Arab origin, their forefathers having obtained supremacy at an early period. The Wambugu look not unlike degenerate Wakuavi, who, driven to Usambara for refuge by their foes, have, in the course of time, lost their language, and become assimilated to the people with whom they are living, in every thing but an unalterable physique and a few incorrigible manners and customs. The Wasambara are just what you would expect to find the aborigines of such a country to be. Kimweri claimed relationship with the people of Chaga, and this would rather support than militate against my theory. The two peoples are in many respects very similar; for instance, in their love of hills, in their form of government, and in their physical conformation. These, however, are only suggestions rather than authoritative data upon the subject.

After a stay of more than a week at Vuga, during which time I was treated with the most generous hospitality by the young king Kimweri, whose chief request in return was that I would obtain for him about a score of cannon and a number of

men to make gunpowder for him, I took my leave of the place. I struck across the mountains in a north-easterly direction, passed up fine valleys more than 4000 feet above the level of the sea, ascended ridges and peaks more than 6000 feet in height, and descended to the plain on the northern side of the block. We were five days in doing this, and though we did not travel all day, such was the severity of the task that my men, who were not novices in African travel, said they were never so fatigued in their lives.

Our way now ran in a somewhat out-of-the-way course, at first towards Buiti, in the country of the Wasegeju, then in a direct line through the low lands of the Wadigo to Mombasa, which we reached in forty-five days after our departure from Zanzibar.

NOTE TO THE MAP OF CENTRAL ASIA BY JOHN ARROWSMITH.

THE accompanying Map of Central Asia, which the Council of the Society have now the satisfaction of issuing to the Fellows, is the one announced at the end of the Tables of Contents in the Journals of 1868, 1869, and 1876, as being then in preparation. It was originally intended to be a Map of Western Turkistan only, but the design was expanded afterwards by the compiler. After the death of Mr. Arrowsmith, the plate of the map became the property of Mr. Stanford, from whom copies have been obtained for insertion in the present Volume.

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